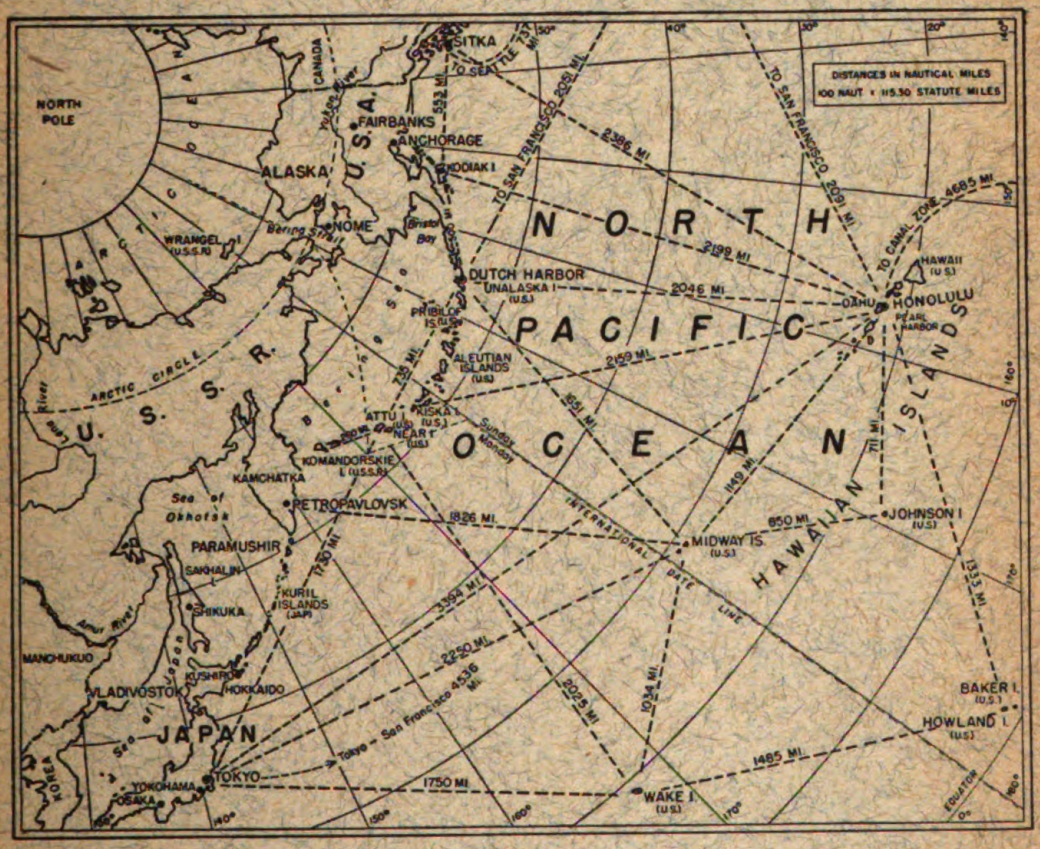
VOL. IV, NO. 2 AUGUST 1945

# THE BULLETIN

OF THE

## U. S. Army Medical Department

**A periodical containing original articles, reviews, news, and abstracts of interest to the Medical Department of the Army**




ISSUED UNDER THE AUSPICES OF
THE OFFICE OF THE SURGEON GENERAL

PUBLISHED MONTHLY AT THE MEDICAL FIELD SERVICE SCHOOL,
CARLISLE BARRACKS, PENNSYLVANIA

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NORMAN T. KIRK,
Major General, U. S. Army,
The Surgeon General.

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WASHINGTON 25, D. C.

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# Foreword

With the October 1943 issue, The Bulletin became a monthly periodical, instead of a quarterly, dedicated to keeping the personnel of the Medical Department informed on developments in war medicine. The new publication, known as The Bulletin of the U. S. Army Medical Department, absorbed the former quarterly dental and veterinary bulletins and will have material devoted to those fields in each issue.

The Bulletin is intended to be educational rather than directive in nature. It will contain the best information obtainable concerning military medical experience, observations, and procedure that may help to improve further the quality of professional services. The Bulletin will be a medium whereby experience gained in one theater of combat may be shared with those serving in other combat areas and with those in this country who are preparing for overseas duty. News items concerning military and scientific developments as well as original articles will be emphasized. The Bulletin, however, should not serve as a basis for the forwarding of requisitions for equipment or supplies referred to therein.

Obviously, some of the most interesting field experiences cannot be divulged in a periodical of this kind when our country is at war. The Bulletin will, however, publish that which can be safely told, drawing not only on current literature, but on many authoritative reports which reach The Surgeon General's Office from the field. Officers are invited to submit for publication reports of their field experiences that can profitably be shared with other officers.

The Medical Department has been commended for its work in caring for the sick and wounded in theaters of operations in war. The Bulletin will endeavor to stimulate such progress and to advance further the high standard of medical service in the Army of the United States.

VOL. IV, No. 2 AUGUST 1945

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# News and Comment

## SUPPLY PLANNING FOR REDEPLOYMENT

Having known long before the landings in Normandy that Germany would collapse earlier than Japan, it became necessary for the supply service to make definite plans for redeployment and demobilization. The decision was made to attack the problem with two plans: (1) a matériel demobilization plan concerned with procurement planning, scheduling of production, procurement cutback, and contract termination; and (2) a basic supply plan providing for the redeployment of supplies and equipment from the European and Mediterranean Theaters.

The General Staff issued a basic War Department plan which the Ground Forces, Air Forces, and Service Forces were instructed to implement. The Army Service Forces' implementation of the basic plan assigned a large number of actions to the chief of each technical service, and in order to carry out some of these actions, the supply service prepared the plans referred to above. At first, these plans were made without the benefit of any experience. They were voluminous and attempted to provide for all contingencies that could be anticipated. Early in 1944, the plans of the various technical services were compared and the result of this action was that plans were produced which were uniform in format and characterized by the same over-all governing assumptions. Each technical service then incorporated into its plans the special assumptions peculiar to its objectives and the actions necessary to achieve these objectives. It became possible to eliminate a number of actions in the matériel demobilization plan by revising current procurement directives and contract termination procedures so they would cover the situations anticipated. When VE-day arrived, the matériel demobilization phase of planning consisted, therefore, primarily of reducing the program of procurement to fit the needs of the one-front war, and, in addition, a few minor operations primarily concerned with the war in Europe. These contemplated actions were put into effect by higher authority on VE-day and thus ceased to be a part of the plan.

The basic supply plan was affected by so many uncertain factors that it assumed shape slowly and became "firm" relatively late. Perhaps the first definite implementation of the supply plan occurred in October 1944. Beginning then, shipments of supplies and equipment moving through East Coast ports to European theaters were marked to indicate either that the shipment was to be stopped ("STO") or was to go forward ("SHP") when the VE-day embargo was proclaimed. Because

of the sudden collapse of German forces in northern Italy, it was possible to stop shipments to the Mediterranean Theater a few days before the embargo became effective for the European Theater. This particular action is typical of the plan for redeployment. Other actions were added as the need for specific steps became apparent, each accomplishing a small part of the whole program for directing the flow of supplies at the conclusion of the two-front war.

Many related subjects were studied in attempting to foresee the needs which must be planned for in redeployment and demobilization. For example, the 26th Medical Depot, which accomplished the closing of the Desert Training Center in California, furnished a complete study of its activities in fulfilling that mission. This study enabled the planning officers to anticipate problems relating to the reception, storage, and disposition of surplus medical equipment turned in by a using agency. Several supply officers from the European theaters were asked to study the various actions appearing in this plan. From them and from reports submitted by the theaters, it was possible to foresee a number of problems which might and probably would arise. Especially helpful were the estimates of the condition of supplies and equipment in Europe. These enabled the supply service to compute the replacements which would be necessary.

The vast flow of medical supplies which once entered our depots in England and France is now a mere trickle. The great pipe line has been swung in the direction of Japan, and through it an increasing volume of medical supplies is being conveyed to the Pacific area.

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## ASIATIC RELAPSING FEVER

One hundred and thirty-four cases of relapsing fever due to *Spirochaeta recurrentis*, presumably louse-borne, were effectively treated by the administration of mapharsen. These patients were Chinese soldiers treated at a United States Army station hospital in a remote section of Assam and as a group showed, almost without exception, signs of malnutrition and multiple vitamin deficiencies. Many had beriberi. Many had pellagra, a few, scurvy, and almost 100 percent of the stools examined contained ova, usually of hookworm or ascaris.

Spirochetes, in most cases found on the first smear, were usually plentiful, many smears showing tremendous numbers in each field. All positive smears were checked by trained workers and only cases in which *S. recurrentis* was found in the smear were included in the series here reported. The clinical diagnosis of relapsing fever in a tropical zone is difficult, as it must be differentiated from malaria, typhus, ratbite fever, dengue,

Abstract of a paper by Lieut. Colonel Bernard P. Wolff, M.C., A.U.S., submitted through The Surgeon General's Office to Annals of Internal Medicine.

pappataci fever, and other febrile conditions. In these cases, spirochetes were found in all stages of the disease but were far more numerous during the febrile attack. The economic status of the patient plays a large role in the severity of relapsing fever and the mortality rate varies inversely with the nutritional state.

In the past, neoarsphenamine and salvarsan have been used with satisfactory results in epidemics of relapsing fever; however, in the epidemic reported here, mapharsen was used because of its availability, low toxicity, and ease of administration. As far as the author was able to determine, mapharsen had not been previously reported in the treatment of relapsing fever. The best results were obtained in this group of cases when two intravenous injections, each 0.04 gm., were given three to five days apart. Following such treatment, 13 percent of these cases had recurrence, on the average on the fifth day after the initial injection, but in some, as soon as two and as late as twelve days. The recurrence was in every way similar to the original attack, although spirochetes were rarely found when smears were taken during recurrence. No toxic reactions were noted with this dosage; however, at first, when larger doses (0.06 gm.) were used, some mild toxic reactions occurred. Convalescence was rapid following the use of mapharsen, and recovery was complete in a few days.

In previously reported epidemics of relapsing fever, the mortality rate varied from 2 to 50 percent. In this series of 134 cases, 11.9 percent of the patients died, which, considering the very poor nutritional state of the patients before contracting relapsing fever and their health in general, was lower than might have been expected. The cause of death could not be accurately determined because of inability to obtain necropsies; but from the clinical standpoint, eight of the fatal cases died in a state of circulatory collapse, three in coma, two of convulsions and hyperpyrexia, two following severe hemorrhage, and one as a result of secondary parotitis.

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## AN AID IN THE RECOGNITION OF SCHISTOSOMIASIS JAPONICA

While the diagnosis of schistosomiasis japonica should always be confirmed by demonstration of the parasite or its eggs, the possible presence of the disease should be recognized on the basis of epidemiological and clinical grounds. In a report from overseas, Major A. S. Johnson, M.C., and Lieut. Colonel M. G. Berry, M.C., emphasize the helpfulness of sigmoidoscopic examination. These observers were able to demonstrate in many cases clusters of small yellowish nodules or plaques beneath the normal mucosa, and have shown that these contain schistosome eggs. Experience in the United States has confirmed this finding.

## IMPROVED REPELLENTS FOR PROTECTION AGAINST SCRUB TYPHUS

The most important individual protective measure for preventing scrub typhus is the impregnation of clothing with chemicals which kill the larval mite vector before it becomes attached to the skin. Quartermaster item, Repellent, insect, clothing treatment (Stock No. 51-R-300), packaged in one-gallon metal containers, is provided for this purpose. Originally, this item contained 100 percent dimethyl phthalate, which, when used to prepare an aqueous emulsion containing 5 percent dimethyl phthalate, required the use of 2 percent GI soap. This emulsion technique to impregnate clothing against mites has largely replaced application by hand or by spraying. Dimethyl-phthalate-treated clothing also affords protection against mosquito bites through fabric for a limited time. Changes in the content of Repellent, insect, clothing treatment, have been made recently to facilitate its use in the field and to increase the persistence of the miticide in garments.

To eliminate the need for using GI soap as an emulsifier and to simplify the preparation of an emulsion, an emulsifying agent has been incorporated with the dimethyl phthalate in the stock item. Repellent containing dimethyl phthalate with an emulsifier can be distinguished by the label on the container which indicates the contents and gives instructions for its use, which are as follows:

REPELLENT, INSECT, CLOTHING TREATMENT
Stock No. 51-R-300
(DIMETHYL PHTHALATE—with added emulsifying agent)
Use: To impregnate clothing for protection against MITES AND BITING INSECTS.

*Preparation of the emulsion.* To one part of this Repellent, insect, clothing treatment, slowly add 17 parts of unheated water, with vigorous whipping and continuous stirring. This makes a 5 percent emulsion of dimethyl phthalate. No soap needed. Two gallons of the repellent emulsified with 34 gallons of water will treat approximately 100 uniforms or 33 blankets. Prepare emulsion just before use.

*Impregnation of clothing.* Treat only dry garments. Completely immerse clothing, shirt, trousers, coveralls, leggings, and socks (may be placed in trouser pockets) in the emulsion. Wring out over a second container to save excess liquid for reuse. Hang up to dry. Blankets and mosquito bars may also be treated in the above manner. Properly treated clothing will protect against mites between launderings, under average conditions of wearing; will protect from mosquito bites through fabric for several days; and will repel sandflies, fleas, gnats, and to some extent, ticks. Thorough treatment withstands sun, rain, and sweat. *Laundering and wading through streams removes the dimethyl phthalate.* Repeat treatment after each laundering, or oftener if necessary. To aid troop inspection, mark clothes distinctly to indicate date of latest treatment.

*PRECAUTION.* Untreated shorts should be worn under treated uniforms to prevent skin irritation in the groin. Caps, when treated, should be held by the bill while dipping only the crown, to prevent damage to the laminated visor by the emulsion.

Two other effective miticides, benzyl benzoate and dibutyl phthalate, have been shown by extensive laboratory and field trials to be more resistant to removal by washing than dimethyl phthalate. Recently, production of benzyl benzoate and dibutyl phthalate has been increased, and these chemicals are being substituted for dimethyl phthalate in the QM item, Repellent, insect, clothing treatment. Emulsifiers are incorporated with both new compounds. Thorough treatment with benzyl benzoate and dibutyl phthalate for protection against mites withstands wading through streams and at least two launderings with soap and hot water. In contrast to dimethyl phthalate, they do not repel mosquitoes. All types of bulk repellent issued for the impregnation of clothing are listed under Repellent, insect, clothing treatment, QM Stock No. 51-R-300, and may be distinguished by the label and markings on the container, on which the contents and instructions for use are given. Although the new miticides are now being produced in quantity, present stocks of bulk repellent in overseas theaters consist largely of dimethyl phthalate, with or without an emulsifying agent. The labels of all bulk repellents should be examined carefully to determine the contents before use. All of these repellent preparations, with proper application, afford effective protection against mites, and the changes which have been made have been designed to facilitate their use in the field and to provide miticides which are more resistant to removal by leaching and washing.

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## WATER PURIFICATION WHEN AMEBIC DYSENTERY IS PREVALENT

Directives in the India-Burma Theater provide precautions in water purification where amebic dysentery is prevalent. Using the standard mobile or portable water purification units, the following procedures should be used: a coagulant dosage to give a heavy, rapidly settling floc employing batch treatment with a minimum settling period of one hour; filter rates restricted to 10 gallons per minute for portable units and 60 gallons per minute for mobile units; chlorination to a residual of 1 p.p.m. Using Lyster bags, the chlorine dosages must produce a 1 p.p.m. residual after ten minutes' contact; in addition, 1 ampule of calcium hypochlorite should be added then, and thirty minutes more allowed before using the water. Maximum use of subsurface waters is recommended.

Since boiling does not ensure against recontamination, chlorination should always be the last step in the purification process. Boiled water should be cooled before chlorination, as chlorine is dissipated rapidly from hot water.

## TRAINING AIDS IN TROPICAL DISEASES

In training military personnel being deployed from temperate areas to the Pacific-Asiatic theaters, there is vital need for the fullest possible instruction in tropical diseases and their prevention. Some of the most suitable War Department training aids, relating to the prevention and control of malaria and other insect-borne and tropical diseases, are presented below. Additional films, posters, and other health education materials on scrub typhus, schistosomiasis, sandfly control, and malaria are in preparation.

*War Department Technical Bulletins and Publications.* These may be obtained by requisition through proper local publication channels.

TB MED 6. Data from Field on Malaria Control, January 1944.
TB MED 14. Use of DDT as a Mosquito Larvicide, March 1944.
TB MED 31. Scrub Typhus Fever (Tsutsugamushi Disease), April 1944.
TB MED 42. Data from the Field on Malaria Control, May 1944.
TB MED 65. Drug Suppressive Treatment of Malaria, July 1944.
TB MED 72. Treatment of Clinical Malaria and Malarial Parasitemia, July 1944.
TB MED 82. Sand-fly (Pappataci, Phlebotomus) Fever, August 1944.
TB MED 87. Data on Malaria Control, August 1944.
TB MED 110. Use of DDT as Insecticide to Kill Adult Mosquitoes, October 1944.
TB MED 119. Bacillary Dysentery, November 1944.
TB MED 121. Impregnation of Clothing with Insect Repellent (Dimethyl phthalate), December 1944.
TB MED 124. Plague, December 1944.
TB MED 134. Data on Malaria Control, January 1945.
TB MED 136. Avoidance of Relapses of Vivax Malaria by Use of Suppressive Medication, January 1945.
TB MED 138. Cholera, February 1945.
TB MED 142. Filariasis (Wuchereria) with Special Reference to Early Stages, February 1945.
TB MED 144. Rodent Control, April 1945.
TB MED 159. Amebiasis, May 1945.
TB MED 164. Malaria Control in the Army, June 1945.
TB MED 167. Schistosomiasis Japonica, June 1945.

WD Training Circular No. 16, dated 14 April 1945. Malaria Control and Malaria Discipline.
WD Circular No. 163, dated 4 June 1945. Insect and Rodent Control.
WD Pamphlet No. 8-6, dated October 1943. Geographical Distribution of Certain Diseases.

FM 21-10. Basic Field Manual. Military Sanitation and First Aid.

TM 8-227. Technical Manual. Methods for Laboratory Technicians.

*Films.* These may be obtained from Signal Corps film libraries or sub-libraries.

Training Film 8-953. Malaria, Cause and Control.
TF 8-1378. Clinical Malaria.
TF 1-3343. Malaria Discipline.

Miscellaneous Film No. 157. The Mosquito.

MF 1035. Private Snafu vs. Malaria Mike.
MF 1046. Silent Battle.

Film Bulletin 147. Medical Service in the Jungle.
FB 195. DDT Weapon Against Disease.
FB 200. Malaria Control on Corsica.

Army-Navy Screen Magazine No. 38, part of GI Movie Weekly Release No. 61, Target Snafu.

*Miscellaneous training aids.* These may be obtained by requisition from Adjutant General depots.

WD Graphic Training Aid 8-4. Graphic portfolio on Malaria.
WD Pamphlet, "This is Ann." U. S. Government Printing Office 1944-O-565454. In Z/I copies are issued to instructors only.
WD Series of 15 posters on Malaria. U. S. Government Printing Office: 1944-O-574718. May be requisitioned from Surgeon General's Office.
Recordings, 12-inch, 4 sides entitled, "Know Your Enemy, Malaria." Requisition from CG, ASF, Attention: Director, Information and Education Division, Room 2E-600, The Pentagon, Washington 25, D. C.

*Equipment for basic malaria training program.* The materials and equipment for the prevention and control of malaria and other insect-borne diseases listed below are valuable in conducting training in tropical disease control. See W.D. Training Circular No. 16, 1945, and W.D. Circular No. 163, June 1945.

Bar, mosquito (QM).
Jungle hammock (QM).
Insecticide, Aerosol, 1-pound dispenser, QM Item No. 51-I-159.
Repellent, insect (2-ounce bottle), QM Item No. 51-R-265. For protection against mosquitoes and biting flies.
Repellent, insect, clothing treatment. QM Item No. 5-R-300. For protection against scrub typhus.
Kit, jungle, medical, individual M-2. Medical Item No. 9710900.
Atabrine tablets (MD).
Insecticide, spray, DDT, residual effect. QM Item No. 51-I-305.
Sprayer, liquid, insect, continuous spray. QM Item No. 41-S-4106.
Larvicide, DDT, powder, dissolving. QM Item No. 51-L-120. For preparation of DDT solution in oil for destruction of mosquito larvae.
Diesel oil No. 2 (QM). A solvent for DDT, powder, dissolving.
Sprayer, insect, knapsack type, plunger type, cylindrical shape, 3-gal. capacity. Engineer Stock No. 41-7839.400-.030.
Headnet, insect.
Gloves, mosquito.

The following textbooks, which are standard Medical Department items, provide background material on tropical diseases and are available at various medical facilities.

Practical Bacteriology, Haematology, and Animal Parasitology. Medical Dept. Item No. B 230280.
Clinical Parasitology. B 270250.
Clinical Diagnosis by Laboratory Methods. B 200230.
Stitt's Diagnosis, Prevention and Treatment of Tropical Diseases, 2 vols. B 282030.
Mosquito Control. B 571290.
Microscopic Diagnosis of Malaria in Man, Manual for. National Institute of Health Bulletin 180. B 230030.
Medical Entomology. B 570030.

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## DID YOU RECEIVE YOUR BULLETIN?

During redeployment following VE-day, certain medical units have been or will be on board ships at sea and many officers will be away from their former Army address. If, during this period, any Medical, Dental, Veterinary, or Sanitary Corps officer fails to receive *The Bulletin,* he may write to The Surgeon General's Office, Washington 25, D. C., where an effort will be made to forward *The Bulletin* to him.

Scrub typhus ward in a station hospital in New Guinea, used by the Special Commission on Scrub Typhus in 1943.

Special Commission comprising members of the Board for the Investigation of Influenza and Other Epidemic Diseases in the Army and representatives of the U.S.A. Typhus Commission sent to investigate scrub typhus just after landing in New Guinea in 1943. Left to right: Dr. Francis G. Blake, president of the Board, Lieut. Colonel Joseph F. Sadusk, Jr., M. C., First Lieut. E. John Bell, Sn.C., and Captain Glenn Kohls, Sn.C., representing the U.S.A. Typhus Commission, and Dr. Kenneth F. Maxcy, board member. In addition to members of the Commission, this plane carried a ton of equipment and supplies for setting up the laboratory. See page 171.

## ELECTROENCEPHALOGRAPHY IN THE ARMY

The electroencephalograph is now a regular part of the diagnostic armamentarium in all neurological centers and in a number of other neuropsychiatric departments in Army hospitals. Instruments have been installed also in base area hospitals in overseas theaters where they have been useful, especially in the study of head injuries and in the blast concussion type of case. One unit was installed in a 6- by 6-ft. van truck so it could be taken to the combat echelons for early study of the blast cases. With proper screening and careful mounting, this proved to be a technically sound method, and reliable records were made on cases shortly after they had been injured. It is anticipated that this same EEG setup will be moved to the Pacific theater, where forward echelon studies may be continued in an effort to gain more information as to the nature of certain traumatic head syndromes seen in war.

A total of 35 electroencephalograph machines have been installed in Army Service Forces hospitals in the zone of the interior and 6 in the Army Air Forces installations. Five electroencephalographs have been installed in overseas installations, with several more to be added to key installations in the Pacific theater. To ensure the highest technical competence and facilitate a standard application of this new technique, one superior 4- and 6-channel type of machine was standardized for use in the Army. To further assure uniformity of application and understanding, War Department Technical Bulletin TB MED 74, directs the operation and interpretation of the electroencephalogram. Special courses were authorized by the Army Service Forces Training Division for the instruction of medical officers and technicians in electroencephalography. Neurological medical officers are given four weeks' intensive instruction in the interpretation of the electroencephalogram. Technicians are given twelve weeks of training in the operation of the electroencephalograph and recognition of artifacts common to such studies. Many of these technicians were previously skilled radar technicians released by the Signal Corps to the Medical Department for this new complex type of work. Maintenance of these EEG machines receives the well-coordinated attention of electronic engineers working out of the Supply Service of The Surgeon General's Office.

The electroencephalograph has been of great value in problems of epilepsy and has shortened hospitalization for this disorder in Army hospitals. It has been of great assistance in the study of head injuries, especially those severe penetrating injuries of the brain and complications of head trauma such as subdural hematomata. It has been of additional value in localizing brain tumors, brain abscesses, hemorrhage, thrombosis, and in the study of the inflammatory and degenerative disorders of the brain. More recently it has been

adapted to use in electromyographic studies in peripheral nerve injuries and other neuromuscular disorders.

It is believed that a real contribution has been made to the science of electroencephalography by the Army's insistence on conservative, uniform, and simplified application of a highly complex method of study of disorders of the nervous system through careful selection of trained personnel and the use of one especially high-grade type of instrument.

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## POLIOMYELITIS IN THE ARMY

Poliomyelitis in the Army in continental United States has occurred about in proportion to the prevalence in the civilian population. During the first 22 weeks of 1945 there were 810 civilian cases in the United States as compared with 545 during the same period of 1944 and a median of 545 for this period during 1940-44. Military cases in the United States during the same 22-week periods were 44 in 1945 and 25 in 1944. Thus poliomyelitis has been epidemic in the United States during 1943 and 1944, and the incidence in 1945 through May has been higher than last year.

| Attack rate per 100,000 per year | | |
|---|---|---|
| | Civilian | Army |
| 1941 | 6.8 | 3.3 |
| 1942 | 3.2 | 1.4 |
| 1943 | 9.8 | 3.4 |
| 1944 | 14.9 | 4.0 |

Epidemics of poliomyelitis have been rare in Army camps in this country. Nearly all cases have been sporadic and widely scattered. An epidemic of 18 cases which occurred in late March and April at Fort McClellan, Alabama, is reported because of some unusual features: (1) its explosive character, (2) occurrence out of season (although the weather was unseasonably warm, approaching summer temperature), and (3) the high proportion of bulbar cases. Three civilian cases were reported in near-by counties in the month preceding the camp epidemic. The first Army case (onset 1 March) was mild and was not recognized until 29 March. The remaining cases occurred in rapid succession, starting 21 March. Sixteen cases had onset within 25 days, 10 with bulbar symptoms. Three deaths occurred. At autopsy, characteristic lesions were found in all three cases and poliomyelitis virus was recovered from the central nervous system of one patient. All reported cases were paralytic.

There was no contact among the cases which were scattered throughout the camp, only two companies having two cases. The camp water source was good, being the same as that of a near-by city which had no cases. No cross connections were discovered, and weekly samples were consistently negative for coliform organisms. Sewage disposal was by a modern treatment plant.

There had been few insects. Flies had begun to appear in

small numbers during March. Epidemiological evidence that any food served as a means of transmission of the virus was not found, although one source of milk was not above suspicion on grounds of dairy hygiene.

The outbreak was studied jointly by the post surgeon, the Fourth Service Command medical inspector's staff, and the Commission on Neurotropic Virus Diseases of the Army Epidemiological Board, which now is testing food samples, water, flies, and sewage sludge, for the presence of poliomyelitis virus. In spite of a thorough investigation, little information concerning the method of transmission in this outbreak was obtained.

Civilian outbreaks with a high proportion of bulbar cases have been reported in recent years. A local outbreak in 1944 in Wisconsin yielded 22 paralytic cases of which 9 were bulbar.

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### PSYCHOTHERAPY WITH PENTOTHAL NARCOSIS

In our experience, sodium pentothal used in accord with the technique outlined by Grinker and Spiegel has been quite successful as a time-saving procedure; however, as they point out, this method of treatment calls for genuine psychiatric understanding. It cannot be resorted to successfully when regarded merely as a means of reducing tension, as though anxiety were a physical substance of fixed amount to be drained off at will. Little will be gained if the pentothal interviews are merely used to elicit information concerning psychologically traumatic experiences without further use being made of that material. Along with the genuine value of releasing tension and anxiety there must go an attempt at synthesis and use of the assets of the personality, so the patient is able to reintegrate himself after the stressful situation has been abreacted. As a result of all the emphasis on the value of abreaction of combat experiences, it is not to be assumed that such abreaction and the material thus elicited necessarily become the focal point of treatment. Therapy must not be allowed to go astray because of preoccupation with combat reactions to the exclusion of matters which may be of greater significance. Occasionally, a frustrating situation in the patient's current military or domestic life may be productive of a neurotic reaction, the pattern of which, however, is highly colored by the patient's previous combat experiences. The patient may find it much easier to talk about his combat experiences than about the current situation of stress, even though it may be relatively trivial. The psychiatrist may fall into this trap and a sort of *folie-a-deux* may be set up, in which physician and patient become lost in the past and center their attention on nonexistent or minimal combat reactions, thus missing the present frustrating situation, which must be dealt with before recovery can occur.

Extract from article by Major Charles W. Miller, Jr., M.C., entitled "Delayed Combat Reactions in Air Force Personnel."

## PSYCHIATRIC NOMENCLATURE

In its present stage, psychiatric nomenclature represents a conglomerate concept of terms with a wide latitude of classification of psychotic responses and a very limited and rigid classification of neurotic responses. This nomenclature is difficult to use. Even among psychiatrists, there is a widespread lack of uniformity in the interpretation of various diagnostic categories. The Neuropsychiatry Consultants Division of The Surgeon General's Office, in attempting a revision of the diagnostic terminology, presently in use, has held numerous conferences and solicited widely the opinions of leading psychiatrists in military and civilian life.

An initial step has been made by the Army in the direction of changing the method of recording the diagnosis in psychoneurotic responses. The term "psychoneurosis" is to be dropped from the individual clinical records in Army medical installations. In its stead, the physician will designate the specific type of psychoneurotic response, such as "anxiety reaction," "conversion reaction," "compulsive obsessive reaction." In addition to this term designating the syndrome, a brief statement on the personality structure and predisposition will be made, a brief statement on the external precipitating stress in the present illness, and finally an evaluation of the functional capacity of the individual to carry on in his last assignment. By this method it is believed the psychiatrist of necessity will be more specific and will be required to formulate a more complete picture of the patient in terms understandable even to a layman.

The possible benefits from this system include a more thoughtful consideration and evaluation of the patient, a more definitive diagnostic formulation which will be more easily and clearly understood by nonpsychiatric personnel, less misuse of diagnostic terms, an opportunity to indicate that even though the patient has some form of psychoneurosis he need not and should not be discharged from the service, and less chance on the part of the public for misunderstanding the term "psychoneurosis."

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## PSYCHONEUROSIS AMONG OFFICERS

The importance of leadership in maintaining proper motivation and good mental health in the Army is being increasingly recognized. One of the most important duties of psychiatrists is as advisor to commanding officers on policies and procedures which affect mental health and morale. In certain divisions and in some commands there appear to be excellent morale and splendid accomplishment, which are in part due to an ideal relationship between the psychiatrist, the surgeon, and the responsible officers of the command. This interest is exemplified in the following directive from Lieut.

## General L. K. Truscott, Jr., Commanding General, Fifth Army, to the Commanding Generals, all Corps and Divisions, Fifth Army.

1. Psychoneurosis cases among officers of this command is a matter of grave concern, not because of the frequency of such cases, but because of the effect each officer case has on other personnel of an organization. While I am certain that you are giving constant thought and attention to this subject, I do not believe that we have exhausted our capabilities for preventing such cases, or in handling efficiently cases that do occur.

2. My purpose in writing this letter is to acquaint you with my thoughts on this matter, and request your ideas and suggestions with a view to establishing a uniform procedure for handling psychoneurosis and exhaustion cases among officers throughout the Army.

3. Many cases of exhaustion or extreme fatigue are initially mistaken for psychoneurosis. The administration of a sedative, to insure complete relaxation, and a period of rest will restore such cases to normal. Vigilance on the part of immediate commanders will detect such cases and permit corrective measures before the case becomes so serious as to require medical attention. There are some individuals who become officers who are so high strung, or so mentally unstable, that they cannot relax during periods of battle; as a result, they may become exhaustion cases, if not actual psychoneurotics, in a comparatively short time. Obviously, such cases should be reclassified before actual harm is done; all commanders must be vigilant to detect such cases in time to permit necessary action.

4. During combat, every division commander should visit regimental commanders, in contact, daily; when possible, he should visit at least some of his battalion commanders daily, during combat; and, when possible, some of his company commanders. Such daily observation by immediate superiors, to include company commanders, should disclose officers who exhibit signs of strain.

5. I do not believe that any officer or enlisted man should ever be evacuated from a regimental area as a psychoneurotic until he has been seen by his regimental commander. This personal interest by regimental commanders will often steel the pride and steady the nerve of an individual who might otherwise become a medical case.

The reactions of men in combat is well expressed in the following quotation from a letter written by a front-line soldier:

> "A combat man certainly has a peak and after he has reached and passed it his efficiency tends to become impaired. Some men have the endurance to go on and on while, with others, the 'cracking at the seams' becomes progressively visible. A deterring factor is, for a man long in combat, a sudden and pronounced awareness of the existence of a 'law of averages.' There are many poses of men who are actively attempting to control their nervousness—men who apply powerful pressure on lagging spirits (this is truly a paradox, but it is true). These men literally pull themselves up by their bootstraps, and overnight become whole again."

6. Officers who are reclassified because of a mental instability, or inability to stand the pressure of combat, are usually undesirable as officers in any capacity. As a general rule, such commissions should, in my opinion, be vacated and the individual returned to a grade, and duty, commensurate with his limited capabilities. In this connection, I am not speaking of individuals who have performed worthy service over long

periods, and who break because of extended strain; such cases we should make every effort to detect before they reach the breaking point, and treat them by rest or reassignment to less strenuous duty for a time.

7. Neuropsychiatrists in the Fifth Army should be, and to the best of my knowledge are, all excellent doctors. Best results in handling neuropsychiatric cases will be obtained when there is a very close relationship between these neuropsychiatrists, the inspector general, and the division commander. Officer cases are so important to the general morale of a division that action to uncover all facts should be initiated as soon as an officer is admitted to the clearing station as a neuropsychiatric patient. This can only be done promptly by direct contact between the neuropsychiatrist and the inspector general. Officer patients who are returned to their units should be returned through command channels, and a complete report, with recommendations on each case, should be made direct to the division commander. I mention this because there have been instances where officer patients have been returned direct to their units, with a letter to their immediate commander, from the neuropsychiatrist. Of course, in such cases, it becomes extremely difficult to take proper action.

8. I have asked MTOUSA to place some good neuropsychiatrists in the officer candidate school to examine candidates there throughout the course, with a view to eliminating the unstable ones before they are commissioned.

9. I would appreciate the views of each corps and division commander on this subject, and would like to know just what procedure is now being followed in each division in handling these cases.

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## MEDICAL DEPARTMENT PSYCHIATRIC FILMS

New films dealing with psychiatric problems in the Army are now available. These films present material that is of great importance and interest to all personnel of the Medical Department. They may be obtained by requisition from Signal Corps film libraries and sublibraries in posts, camps, and stations overseas and in the zone of the interior.

*Psychiatric Procedures in Combat Areas (FB 184)* presents combat psychiatric cases and psychiatric interviews and procedures. The film demonstrates the advantage of forward psychiatric care for cases that develop in combat and describes the results. It shows the handling of cases from the division clearing stations to base hospitals. The picture was taken in Italy under the supervision of psychiatrists who were later sent to the zone of the interior to aid in completing it.

*The New Lot (Misc. 1133),* which was adopted by the U. S. Army from the British film, demonstrates the adjustment problems of five men in the British Army. It shows these men as civilians and in various stages of facing and solving problems of adjustment to the demands of Army life (available only in the zone of the interior).

*Psychiatry for the General Medical Officer (Misc. 1167)* was adopted by the U. S. Army from the British. This film depicts nervous conditions in average persons in civilian life

and shows how they may be carried over into Army life and add to the development of psychiatric reactions to combat. It shows various types of cases, how they are treated in combat areas, and how psychiatric reactions may insidiously creep up on officers as well as enlisted men.

The following psychiatric films, also recently released and available for showing to Medical Department personnel, are very useful for the purposes indicated:

*Introduction to Combat Fatigue (TF 8-1402)* demonstrates and explains how and why combat fatigue develops. In addition to its importance for training Medical Department personnel, it can be valuable for use in selected neuropsychiatric cases in group psychotherapy.

*Care of the Sick and Wounded—The NP Patient (TF 8-1428)* and *Ward Care of Psychotic Patients (TF 8-2090)* are very valuable for training all Medical Department personnel. The two films supplement each other in that the latter demonstrates specific psychiatric methods and techniques while the former gives a more general picture and emphasizes the proper approach and attitude necessary in constructive handling of neuropsychiatric patients.

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The kitchen on a hospital ship, New Guinea, 19 December 1942. Signal Corps photograph.

## CIVILIAN NUTRITION SURVEYS IN WESTERN EUROPE

At the request of SHAEF, G-5, Public Health, The Surgeon General has furnished survey teams for assessing the nutritional status of civilian populations under Army control in Western Europe. These teams are composed of a clinician with special knowledge of nutrition, a nutrition officer of the Sanitary Corps, and a laboratory expert. Using approved nutrition survey methods, they gather information on the clinical state of civilians by physical examination and laboratory tests, and obtain factual data on past and present dietary intakes. Such information is essential for intelligent estimation of the nutritional state of a people and provides the Army with data on which it can properly discharge one of the most important of its civil public health functions.

The first of these teams, headed by Major Marvin B. Corlette, M.C., and dispatched early in April, has worked mostly in Holland. Being assigned to the 1st Canadian Corps, this team worked in proximity to the advancing troops and made surveys in towns of eastern and central Holland as soon as they were liberated. The information secured was used to determine the localities to which Dutch special feeding teams should be dispatched for immediate relief.

Among the general population, the team found that the people everywhere were thin and extremely hungry, and had suffered an average weight loss of about 25 pounds. A rare case of nutritional edema was seen, but no other evidences of specific nutrient deficiencies were observed. Conditions were much worse, however, in such institutions as asylums, orphanages, and old people's homes, where the inmates were unable to shift for themselves and had been forced to exist on a ration of 1,400 to 1,500 calories. In such places emaciation was prevalent, an average of 20 percent had edema due to hypoproteinemia, and many exhibited signs of specific vitamin lack.

On 7 May, when the Germans surrendered, this team was with the first Allied troops that entered Utrecht, Amsterdam, Rotterdam, and The Hague, in which cities rapid nutrition surveys were made in the first few days after liberation. In these western areas conditions were considerably worse than in other parts of Holland. Extreme emaciation and cachexia were common. A few deaths from starvation were observed in all the cities and towns examined. Ten percent of the ambulant population showed nutritional edema and in one city this ran as high as 20 percent. The amounts of food supplied on the official ration for the preceding three months varied from 600 to 900 calories. Actual daily intakes ranged from 750 to 2,000 calories; but only the few who consumed large quantities of sugar beets and tulip bulbs had intakes above 1,200 calories. As of 15 June two other American nutrition survey teams were operating in Germany and by 1 July five such teams were working under the Public Health Branch of G-5, SHAEF.

## INSPECTION OF FOODSTUFFS FOR PRISONERS OF WAR AND OTHERS

Certain meats, meat-foods, and dairy products are procured by the Army for the purpose of feeding prisoners, partisans, patriots, civilians, and prisoners of war. These products are being purchased subject to inspection by the Veterinary Corps. Some of the items purchased for this purpose are not required to meet all of the requirements of Federal or Army specifications for foods bought for the subsistence of troops. This applies particularly to products such as powdered eggs and dried milk, which may be of lower quality than that called for by the provisions of the specifications under which purchases are made for troops.

In order that the Veterinary Corps inspection stamp will not be erroneously interpreted as indicating that foods of animal origin procured for the purpose of feeding prisoners, partisans, patriots, civilians, and prisoners of war have been inspected and passed as meeting the provisions of the specifications governing purchase for troops, a supplementary stamp bearing the letters "P-C" is being placed immediately below the regular Veterinary Corps inspection stamp.

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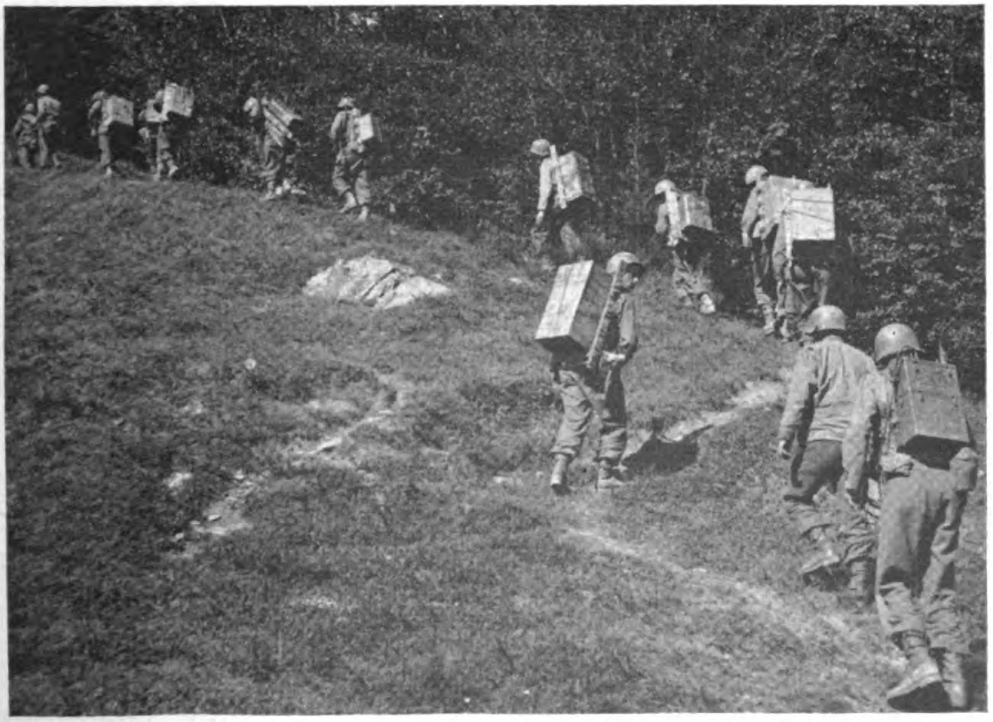

Yanks of 363d Infantry Regiment of Fifth Army carry food rations for U. S. troops in the Apennine Mountains in Italy. 27 September 1944. Signal Corps photograph.

## A HISTORY OF MEDICAL RESEARCH AND DEVELOPMENT

The vast network of Army research establishments operating during this war in all parts of the world has collected scientific data unparalleled in previous military history. However, until this huge amount of data has been carefully sifted and classified, its usefulness to future research and development personnel will be limited. To achieve this objective, the Army Service Forces, in a memorandum dated 31 July 1944, addressed to the chiefs of the technical services, directed that a series of special monographs be prepared on "The Wartime History of Research and Development."

To accomplish its purpose, such a history must be a faithful reproduction of the total research picture; the blind-alley projects as well as the thumping successes; the difficulties still to be surmounted as well as the obstacles overcome. This objective is being kept clearly in mind by the Historical Division of The Surgeon General's Office in the preparation of the medical portions of this over-all history.

The story of medical research and development in World War II is only in part a story of Medical Department activity. Fundamental medical research during these war years has been performed mainly in civilian laboratories operating under contract with such organizations as the Office of Scientific Research and Development and the Division of Medical Sciences of the National Research Council, which have been responsible for the coordination and financing of these projects. Secondly, a number of discoveries of outstanding medical importance have been made by individual scientists acting independently of any formal wartime research program. Other departments of the Federal Government have made significant contributions in the field of medical research and development. Extensive field experimentation with the insecticide DDT by the Department of Agriculture is a case in point. In many instances the adaptation of basic supply items for use by medical personnel has been accomplished in the laboratories of other technical services, the Medical Department acting merely as consultant; and thousands of regular commercial items have been routinely standardized by the Medical Department with little or no modification.

What, then, has been the special creative function of the Medical Department? In the main it has consisted in the conduct of emergency developmental projects at the following Medical Department research facilities: Army Medical Center, Medical Department Equipment Laboratory, Army School of Roentgenology, Veterinary Research Laboratory, Armored Medical Research Laboratory, Army Medical Nutrition Laboratory, and the Ophthalmological Surgical Center. The direct accomplishments of Medical Department research and development in this war have been numerous and impressive. Mobile surgical and dental laboratories and operating trucks;

mobile optical repair units; pack-saddle, mountain, ski, and airplane litters; field refrigerators for the storage of whole blood; lightweight, portable x-ray units; the unit hospital car; the 12-litter, bus-type ambulance—these and many more have made enormous contributions to the basic mission of saving American lives.

A mere recital of tangible accomplishments, however inclusive, would not tell the whole story of Medical Department research and development in World War II. There were failures too, and they should not be omitted from the history of research. And equally important, if not more so than any of these, is the factual record of how all end-results, both good and bad, were obtained; the unprecedented problems that were posed; the solutions that were found or not found; the lessons that were learned or are yet to be learned. An adequate understanding of these aspects depends on a full appreciation of the one basic fact that the United States was engaged in a global war which was and is the most mechanistic war in history. The difficulties which confronted Medical Department research and development personnel at the outset of this war can scarcely be comprehended. The problem of collecting and analyzing crucial data on exotic diseases which had not previously been observed by the average medical practitioner! The problem of devising equipment suitable for use in every quarter of the globe, in all types of climate, and, at the same time, adaptable to the rapid technological changes that were taking place in the mechanics of land, sea, and air transportation!

Even this, an incomplete account, would tell only of the expansion that had occurred in the substance of research. But there were related administrative problems of equal magnitude. The budget estimate for Medical Department research and development, exclusive of funds allotted to the Army Epidemiological Board, for the fiscal year 1940 was only $14,500. By the fiscal year 1945 this figure had grown to $829,000, and along with it was a corresponding expansion of research facilities. Three research laboratories were added, making the total of seven, each working directly with scores of manufacturers or collaborating with other technical services on urgent developmental projects. The problems of administrative coordination and integration thus posed were clearly complex.

A complete history of Medical Department research and development in this war will be, therefore, exceedingly involved and extensive, embracing many scientific fields and numerous industrial and military establishments. To trace the Medical Department's role in this combined research effort is the aim of the present project. The work is well under way, and portions of the material have already been prepared in final narrative form. Distribution of the completed manuscript is limited by directive to certain interested agencies within the

technical services and selected officials in the War and Navy Departments. It is planned, however, to condense the unclassified portions of this itemized project history for inclusion as a separate volume in the final published history of the Medical Department in World War II.

The quarterly and annual reports submitted to the Historical Division by medical installations, both in the zone of the interior and overseas, can be a valuable source of information for this special monograph study. The reactions of field installations to newly developed drug and equipment items are of key importance. Historical officers, charged with the responsibility for preparing these reports, can, therefore, assist by forwarding through channels all pertinent information regarding the field performance of recently standardized catalog items. These additional data will greatly facilitate the making of final evaluations and will ensure a coverage of the utility aspect of Medical Department research and development which would otherwise not be possible.

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## CLARIFICATION OF DENTAL REPORT

A number of errors have been noted in the Report of Dental Service,[1] required by AR 40-1010, Change 4, 10 April 1945. The following comments are presented to assist in the clarification of parts of the report.

*Section 5—Summary.* (1) The number of dental officers assigned or attached should be as listed the last day of the month. (2) The *Total days of duty* is figured by taking the number of dental officers who have been assigned or attached for the entire month, times the number of days in that month; plus the number of dental officers who have been assigned and attached less than a month, times the actual number of days such officers have been assigned or attached. An officer may be sick, on sick leave, on leave, on duties other than dentistry; yet he may be assigned or attached to the dental service of a camp, station, division, or unit. Example: 10 dental officers were assigned or attached to a station for the entire month of April, and 2 dental officers were assigned, one for 10 days during the entire month and another for 15 days during the entire month. The *Total days of duty* would therefore be: 10 times 30, plus 10 days, plus 15 days, or 325. (3) The number which is placed below *Total days of duty* is the total number of days the dental officers (assigned or attached to the dental service) were not available for dental duty, such as days of sick leave, days of sickness, days on any type of leave, days delegated to courts-martial duty, days to duty other than dentistry, or availability for dental duty. Sundays are not included in the number which is placed below *Total days of duty*, if the officer in question is available for dental duty. If

1. W.D., A.G.O. Form No. 8-98 (formerly referred to as M.D. Form No. 57).

the officer is not available for dental duty on Sundays because of leave, sickness, etc., and he is assigned or attached to the dental service of that station, then Sundays are included in the figure which is placed below *Total days of duty*. Example: In (*2*) above, there were 10 dental officers assigned or attached for the entire month and two more dental officers assigned or attached only part of the month to make a grand total of *Total days of duty*, 325.

Suppose two of the above dental officers each were on leave 10 days during the month (20 days' total leave), and one was sick in the hospital at the station for 15 days, and another was delegated by the surgeon of the post to make a sanitary inspection which involved three days. The total days these dental officers were not available for dental duty therefore would be: 20+15+3=38 days. The figure to be inserted below *Total days of duty* would be 38.

If the above figures are accurate, then it is possible for higher echelons, if desired, to subtract 38 from 325 to arrive at a figure of 287 as the actual number of days all officers of above cited station were available for dental duty. It would be possible for a given station, service command, army, department, or The Surgeon General's Office to determine the relative strength or effectiveness for a given month or period of time. There may be 1,000 dental officers in a given service command during the month of May 1945; yet the actual dental personnel effective rate may be only 75 percent or it may be 90 percent. In other words, how many dental officers, assigned or attached, were actually available for dental duty after those officers who are on leave or other duties, etc., are discounted.

There is no intent to analyze the relative amount of work accomplished for a given station or command from these reports, since quality rather than quantity is the real and only measurement of dental service. However, it is fair and just to expect an honest day's work from every dental officer who is on duty.

It is important to know what percentage of the total dental manpower is actually giving dental treatment. No doubt there are months when a field organization is in training or in combat that the dental personnel effective rate may be 25 percent or less. There is no way of making a dental manpower measurement unless these figures in this section of the report are accurate.

*Section 8—General Remarks.* Although AR 40-1010, Change 4, paragraph 2*a*(13)(*a*), states, "Reference (brief) should be made to inadequacies of personnel or equipment or to any other condition which interferes with the maximum of professional service performed for the period," it is not intended that this part of the report list the names of officers, their order numbers, their leaves with dates, their sicknesses,

their assignment to other duties, or the date a particular officer arrived at a station. It is assumed that such data have been incorporated in *Section 5—Summary, Total days of duty,* and the figure which is inserted below *Total days of duty.*

The following information, however, is essential and required in this section of the report (when applicable): (1) Stations taking the impression and completing the laboratory work for dentures, etc., without inserting dentures at that station, will cite such accomplishments. (2) Laboratories, other than central dental laboratories, fabricating dentures for stations other than their own will list such laboratory work. (3) If double shift is in operation, notation should be made thereof. (4) The total number of dental clinics (DC I's, DC II's etc.), dental chairs, cabinets, dental operating units, x-rays, M.D. Chests Nos. 60, 61, and 62, and dental kits available.

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## PROSTHETIC DENTISTRY CONFERENCES

The first in a series of prosthetic dentistry conferences was held at Fort Bragg, North Carolina, 17-19 May 1945. Major General Robert H. Mills, director, Dental Division, Surgeon General's Office, three civilian consultants in prosthetic dentistry, officers at Fort Bragg, and some twenty-five dental officers (prosthetists) from stations of the Fourth Service Command and surrounding Air Forces stations were in attendance. The purpose of the conference was to effect greater efficiency in clinical and laboratory procedures in prosthetic dentistry and to consult with the civilian authorities on prosthetic dentistry regarding the most modern and accepted practices and techniques. Another prosthetic dentistry conference was held in Atlantic City, New Jersey, 7-9 June 1945. In addition to General Mills, this conference was attended by the dental officers (prosthetists) of the First and Second Service Commands, Air Forces stations and the New York Port of Embarkation, and four civilian consultants in prosthetic dentistry.

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## DENTAL OFFICER SERVES WITH GREEK GUERRILLAS

A U.S. Army dental officer had a unique experience in service for a period of seventeen months with the guerrillas in Greece. While serving as a dental officer in North Africa, Captain Robert E. Moyers, a graduate of the University of Iowa, was selected to perform an important service for which he was given special training and instructions on how to live and work behind the German lines. His mission was not to render dental service, but to be the medical supply officer and liaison officer working with the guerrillas. At night, Captain Moyers and the men who were to assist in the mission para-

From the Dental Division, Surgeon General's Office.

chuted into enemy territory in Greece. He was welcomed on landing by members of crews of American and British planes which had been shot down during raids on German targets. Medical supplies and essential foods for the Greeks who were patients in the guerrilla hospitals were parachuted by Allied planes at designated secret points. Travel in the mountains and valleys of Greece generally was on foot or on mule, and distances were measured in days traveled rather than in miles. One or more days frequently were required to transport a wounded or sick guerrilla by litter to a hospital or place of safety. Many nights were spent sleeping in the mountains without shelter. The American officers and men ate the same foods and slept in the same huts as the Greeks. The average diet, when available, consisted of *trahana* (a food made from whole wheat flour and milk, cooked together and spread into large sheets to dry in the sun, then crumbled, mixed with water, cooked and served as porridge), milk (generally goats' milk), eggs and meat, cheese made from goats' milk, vegetables, and a bread made from whole wheat kernels. Thousands of men, women, and children were starving because the Germans destroyed and stole their food. Dental caries was rampant at all age levels.

Captain Moyers accompanied the guerrillas on missions against the German troops in Greece. With no medical officers available, he was called on to do not only first aid, but also hundreds of major surgical operations. Through his initiative and willingness to work day or night, many lives were saved. Captain Moyers has been decorated by the United States, British, and Greek Governments, and he wears the Purple Heart. Now back in the United States, he is ready for another assignment.

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### PENICILLIN IN TREATMENT OF VINCENT'S ANGINA

A preliminary report on the successful treatment of 45 cases of severe, acute Vincent's angina has been received from Major Max Bornstein, M.C. In these cases one or both tonsils had ulcers varying from pinhead size to complete involvement of the tonsil, which was covered with grayish-white slough. Cultures showed the predominance of *Staphylococcus*, nonhemolytic streptococcus, and the presence of pneumococcus and other organisms. All patients were hospitalized at the post hospital at Camp Breckinridge.

The initial dose of penicillin used was 40,000 Oxford units given intramuscularly in the gluteal region, followed by 20,000 units every three hours around the clock until a negative smear was obtained. Invariably, within six to eight hours after the first injection, the patient began to be relieved of his symptoms. On an average, in two to three days the smear was negative for spirochetes and fusiform bacilli, and the temperature

of the 28 cases who had had fever on admittance had returned to normal, where it remained until they were discharged. While the period of hospitalization averaged from five to seven days, the patients were completely relieved of symptoms in about three days and the involved area had completely healed in five days.

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### NEUROGENIC OSSIFYING FIBROMYOPATHIES

In a roentgen survey of the pelvis and lower extremities of 62 soldier patients with paraplegia due to injury or disease of the spinal cord or cauda equina, ectopic deposits of osseous material were noted in the soft tissue in 23 cases. The deposits consisted of masses and sheets of trabeculated bone and were most abundant about the hip and knee joints where they were apparently laid down within muscle or fascial planes. No significant abnormalities were noted in the bones or joints themselves. The ossifications were recognized as early as forty days following cord injury. While 27 of the 62 patients showed evidence of clinical improvement as far as motor and sensory disturbances were concerned, only 3 of these improved patients showed osseous deposits. Of the 35 unimproved patients, however, 20 showed ossifications. Dermatome levels in the patients with ossifications varied from C-7 to and including cauda equina.

In comparing the patients with ossifications with the unaffected group, there appeared to be no significant differences with regard to sites or severity of injuries, time of operative treatment, presence or absence of decubitus ulcers, urinary tract infection or associated injuries or infections, ages of patients, or blood calcium and total protein levels.

In the group with ossifications, there was a slightly higher incidence of renal calculi, and blood phosphorus and phosphatase levels were slightly elevated. Several of these patients had sustained additional trauma to the lower extremities; while ossifications were present in the regions of the hips or knees, no osseous deposits of consequence were noted about the traumatized areas and several fractures showed evidence of normal healing.

The three major types of lesions which have been observed in the affected extremities following disease or injury of the spinal cord, cauda equina, dorsal nerve roots, or peripheral nerves are: (1) osseous and muscular atrophy following loss of motor innervation; (2) osteoarthropathies of the Charcot type following disease or injury of the afferent pathways; and (3) ossifying fibromyopathies following trauma or disease of the cord, cauda equina, or peripheral nerves with consequent paraplegia.

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Abstract of a paper by Major Arthur B. Soule, Jr., M.C., entitled "Neurogenic Ossifying Fibromyopathies; A Preliminary Report."

Bringing home thousands of soldiers, many of them wounded in battles in Europe, the U.S.S. *Wakefield* nears Boston harbor at dawn. Coast Guard photograph.

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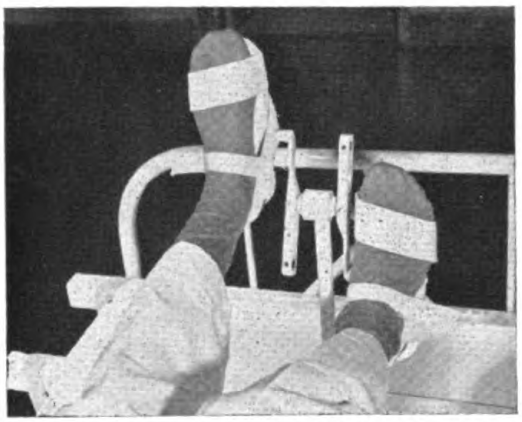
**THE DISABLED SOLDIERS' HOSPITAL WELCOME**

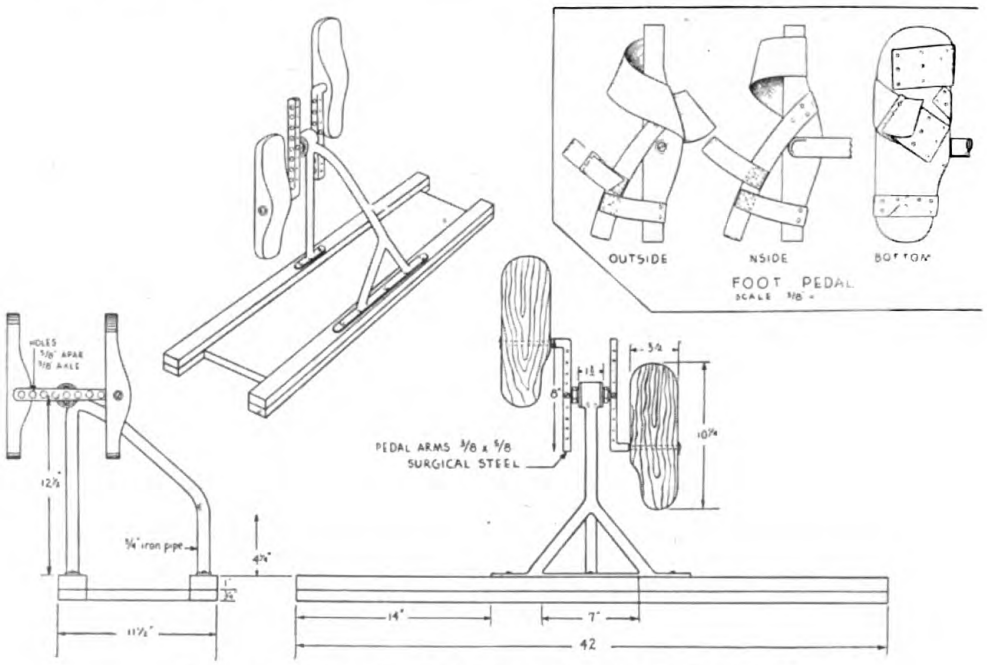
The disabled soldiers of this war have borne their scars and wounds with magnificent fortitude. They expect and deserve more than mere medical care from hospital personnel; they expect appreciation of the sacrifices they have made—they deserve praise and admiration; they expect understanding and tolerance—and they deserve our good will. It is important that every soldier be made to feel that he is "among friends" while a patient in hospital. Civilian employees as well as military personnel should clearly demonstrate to the patient, by deed as well as by word, that they are sincerely interested in him as an individual and that they are unselfishly devoted to the promotion of his well-being. To ensure the existence of that situation requires the diligent efforts of all concerned, and in-service education of all duty personnel. The ambulance driver who meets the train, the stenographer who prepares his medical records on admission, the medical officer who makes the admission examination, the ward officer of the ward to which he is assigned—in fact, all who come in direct contact with him—must recognize the importance of receiving the patient with a warm welcome and understanding.—*Reconditioning News Letter*, Surgeon General's Office, April 1945.

## LEG EXERCISER FOR BED PATIENTS

A leg exerciser has been designed because of the necessity for early motion in patients convalescing from lower extremity injuries. The exerciser has proved beneficial for patients who have not yet reached the state of weight bearing, as an adjunct to the physiotherapy program to facilitate knee and ankle mobility. It may also be used as a means of preventing venostasis in the lower extremities of bed patients recovering from abdominal operations.



The exerciser can be constructed in any brace shop. The framework is made of ¾-in. iron pipe welded to ⅛- by ¾-in. cold-rolled flat iron and bolted to the wooden base. The sprocket assembly contains two round ring ball bearings and a ⅜-in. cold-rolled round iron axle, similar to a standard bicycle sprocket, which could be used. The pedal arms are of ⅜- by ⅝-in. surgical steel and are fastened to the ⅜-in. axle with a setscrew. The axle is countersunk to accommodate the setscrews and to prevent rotation of the pedal arm on the axle. The hole centers on the arms are ⅝ in. apart and




Leg exerciser for bed patients. Specifications.

Designed and constructed by Technical Sergeant Donald Allison, Medical Department, at Letterman General Hospital.

thus adjustable, so that knee and hip flexion can be increased from 10 to 90 degrees. The axle for the foot pedals is ⅜-in. cold-rolled round iron and is welded to the pedal arms. There are two small brass bushings on either side of the wooden foot pedals. These pedals were designed to prevent the patient's feet from slipping while exercising. They are held on the axle by a washer and a screw tapped into the center of the pedal axle. This device is easily secured to any type of hospital bed by four straps, which may be fastened to the bed rails.

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### SPRING WIRE SPLINT FOR PIERSON ATTACHMENT—THOMAS SPLINT

This spring wire foot attachment[1] is constructed of 5/32-inch spring steel wire, as used in the Army spring wire drop foot brace, and is fixed to the bars of the splint by screws and nuts, preferably wing nuts (figures 1 and 2). The rear screws and nuts are brazed onto the splint for attachment to the bar while the forward two screws and nuts are constructed separately and fit over the wire splint and rod, holding them securely. The latter two are not brazed on, because this process tends to eliminate some of the springy quality from the wire splint. This spring wire foot attachment permits active mobilization of the ankle and foot during balanced suspension of the lower extremity and is of special value in cases with complicating peripheral nerve lesions.

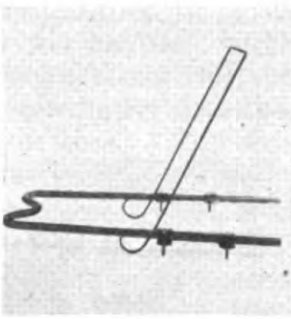

FIGURE 1

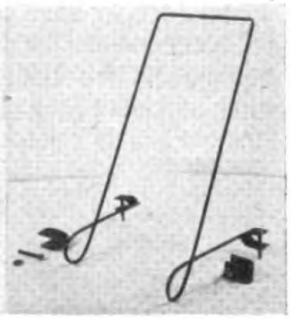

FIGURE 2

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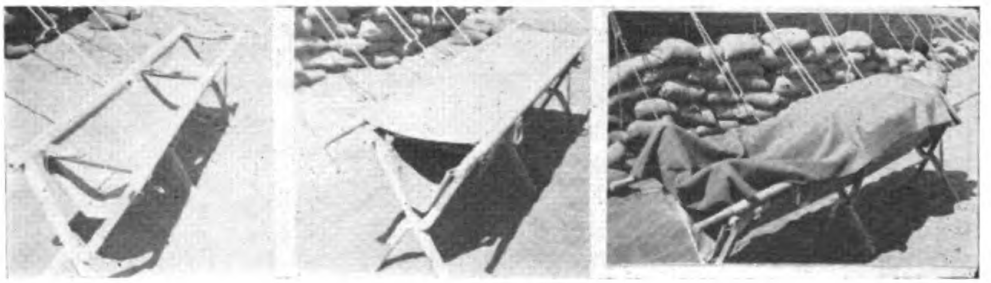
### IMPROVISED LITTER SUPPORT

In a field hospital in the Pacific Ocean Area, several methods were used for the physical handling of casualties prior to their admission to the operating room or to the wards. The casualty was allowed, in nearly all cases, to remain on the litter on which he was borne to the receiving, shock, and preoperative tents. To find a readily available and sturdy support on which to set the litters was a problem. During the Saipan Campaign, the litters at first were set directly on the ground. The carpenters salvaged enough lumber to build wooden horses for supports for litters, but these proved bulky and easily moved out of position.

1. Suggested by Lieut. Colonel Ralph Soto-Hall, M.C., orthopedic consultant, Sixth Service Command, and constructed in the Vaughan General Hospital Orthopedic Shop, Hines, Illinois.

Another suggestion based on the experience of others in North Africa was used during the early days of this hospital's work in the Iwo Jima Campaign. Cots were partially closed and held in that position by the wooden end-sticks in which additional holes had been drilled. The stirrups of the litter fitted over the edge of the partially closed canvas cot. The hinged bars on the under surface of the litter rested on the sides of the cot, which thus bore the weight of litter and patient. This method served to elevate the casualty to a height which made his treatment easier, but it had several disadvantages. The end-stick was easily knocked off, allowing the cot to spread. With repeated use, the cot tended to bulge more and more in the center so that it became too wide to receive the litter unless a man held the edges of the cot close enough to fit between the litter stirrups. During the very busy periods it was inconvenient to spare a man to hold the cot each time a casualty was brought in.

Finally, an eminently satisfactory method was evolved. Three litter straps (Med. Dept. Item No. 7849000) were used to narrow an ordinary canvas cot to a width which would fit between the litter stirrups. One strap was adjusted at each end of the cot and the third across the middle of the cot. The



metal clips on the ends of the straps proved to be excellent fits over the wooden side supports of the cot and strong enough to serve the purpose for which they were used. The photographs illustrate the use of this method.

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## A NOTE ON THE PURITY OF CHEMICAL REAGENTS

The main official grades of purity of chemical reagents in the United States are indicated by the abbreviations N.F., U.S.P., and A.C.S., which refer respectively to the National Formulary, United States Pharmacopoeia, and the American Chemical Society. The purity of a reagent bearing one of these abbreviations on its label is always related to a certain use. In the case of N. F. and U.S.P. chemicals, the purity is such that they may be used for medicinal purposes or for solutions to test materials intended for medicinal purposes, and, in the case of A.C.S. chemicals, they may be employed for general chemical use. There are unofficial grades of purity such as Reagent,

C.P., A.R., N.N.R., T.P., the initials representing "chemically pure," " analytical reagent," "New and Nonofficial Remedies," "tested purity," respectively. The term "technical" refers usually to a grade used for industrial purposes and not necessarily to an impure product. These terms should not be taken to represent grades of purity unless qualified by details of the nature and amounts of impurities.

The grades N.F. and U.S.P. may be meaningless unless qualified by the number of the edition or revision from which the specifications were taken. The National Formulary has been revised by the Council of the American Pharmaceutical Association at intervals of ten years or less, the latest edition being VII, dated 1942. The United States Pharmacopoeia has been revised at intervals of ten years by the United States Pharmacopoeial Conventions which now will provide five-year revisions, and also continuous revision in the form of supplements, the latest decennial revision being XII, dated 1942. Chemical reagents identified as N.F. VII or U.S.P. XII need not and often do not have labels showing the results of analyses for impurities; whereas reagents meeting the specifications of the American Chemical Society are labeled to indicate the nature and amounts of impurities. Consequently, the Formulary and Pharmacopoeia must be scrutinized often to know the nature and amounts of impurities in N.F. and U.S.P. reagents. It does not follow that a reagent of A.C.S. grade is purer than one of U.S.P. grade, though frequently such is the case.

The differences in specifications may be illustrated in the case of phosphoric acid. According to U.S.P. XII, the limitation in the proportion of heavy metals, expressed as lead, is 20 parts per million for acidum phosphoricum, which shall contain not less than 85 percent and not more than 88 percent of $H_3PO_4$. In U.S.P. X, the limitation on heavy metals was expressed in a different manner; viz, a 10 cc. portion of phosphoric acid, previously diluted with 14 volumes of distilled water, when warmed with an equal volume of hydrogen sulfide at 35° C. for thirty minutes should produce a color no greater than that produced by all the reagents except the test material. The label on Baker's C.P. analyzed phosphoric acid, 85 percent, shows the proportions of heavy metals (as Pb) to be 0.0005 percent, or 5 parts per million, and the label states that the product meets the A.C.S. specifications.

For most routine clinical chemistry in the Medical Department of the Army, unless otherwise specified, the limitations of the U.S.P. represent adequate purity. For research work on organic materials with biological action, it may often be necessary to further purify the purest available chemicals in special ways to avoid contamination with substances of similar composition or with certain trace elements. Between these

extremes are a large number of special clinical chemical procedures involving spectroradiometry, fluorometry, gasometry, and so on, for which A.C.S. grade chemicals will be adequate, and for which U.S.P. or even technical grade chemicals may be adequate. The chemicals listed in the Medical Supply Catalog, ASF, have been selected with a view to their use in the methods given in TM 8-227, and ordinarily chemicals of greater purity will not be required. When there is any doubt of purity, solids should be recrystallized and liquids should be redistilled. The equipment in the Medical Supply Catalog, ASF, 1 March 1944, makes possible routine purification of chemicals in the laboratory of general hospitals or in numbered medical general laboratories.

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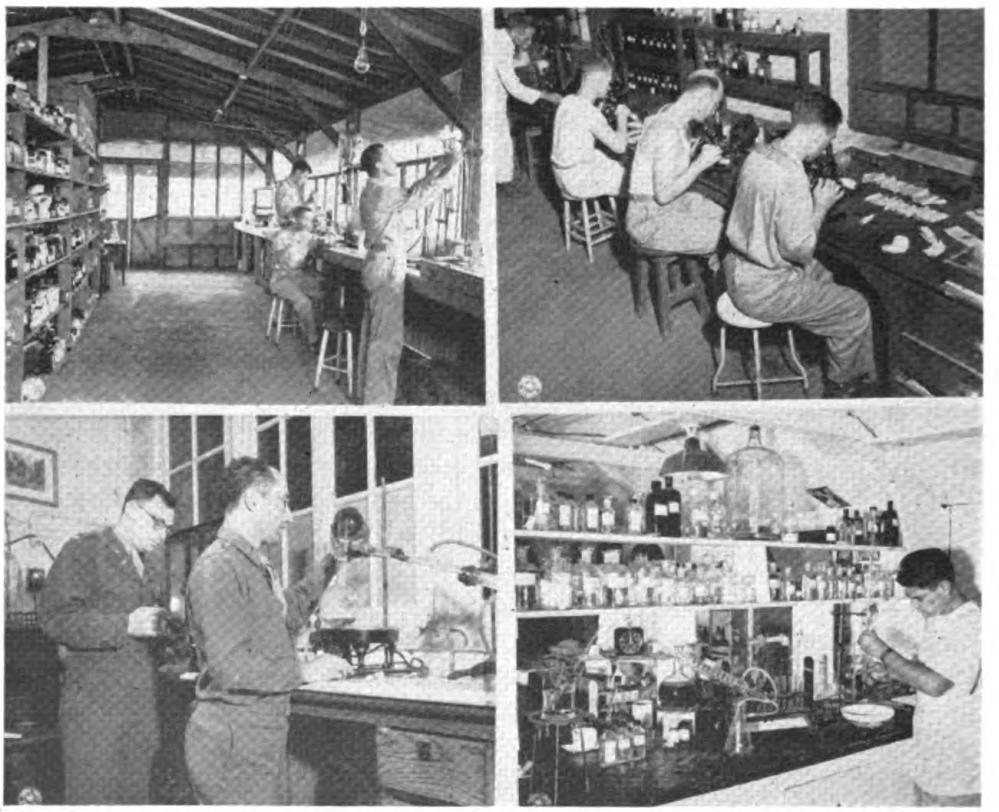
## OVERSEAS ARMY LABORATORIES



Top, left to right: (1) The chemical section of the Third Medical Laboratory, Oro Bay, New Guinea (1943); (2) Examination of samples of blood in the large station hospital laboratory, Calcutta, India (1944); (3) Chemical search for impurities in food at 48th General Hospital, Paris, France (1945); (4) A blood chemistry examination in station hospital laboratory on Guadalcanal 1944).

## PHYSICAL THERAPY CONFERENCE

A technical training conference for directors of physical therapy and physical therapists from general hospitals conducting physical therapy training courses and from selected amputation centers was held at Percy Jones Hospital Center, Battle Creek, and Gardiner General Hospital, Chicago, from 16 to 18 May. The conference was under the direction of Colonel Leonard T. Peterson, orthopedic consultant, who was assisted by Major Emma E. Vogel, director of physical therapists, and Captain Mary Lawrence, physical therapist, all from The Surgeon General's Office. Delegates from the following installations attended the conference:

Ashford General Hospital, White Sulphur Springs, West Virginia.
Lawson General Hospital, Atlanta, Georgia.
Brooke General Hospital, Fort Sam Houston, Texas.
Fitzsimons General Hospital, Denver, Colorado.
O'Reilly General Hospital, Springfield, Missouri.
Army Medical Center, Washington, D. C.
Bushnell General Hospital, Brigham City, Utah.
McCloskey General Hospital, Temple, Texas.
McGuire General Hospital, Richmond, Virginia.
Thomas M. England General Hospital, Atlantic City, New Jersey.
Kennedy General Hospital, Memphis, Tennessee.
Valley Forge General Hospital, Phoenixville, Pennsylvania.
Hoff General Hospital, Santa Barbara, California.
Regional Hospital, Fort Bragg, North Carolina.
Lovell General Hospital, Fort Devens, Massachusetts.
Percy Jones Hospital Center, Battle Creek, Michigan.

The program at Percy Jones General Hospital included discussion of the physical therapy and occupational therapy programs for amputees; iontophoresis; chest conditions with special reference to breathing and other exercises; peripheral nerve injuries and electrodiagnostic tests; physical therapy problems in overseas installations; and problems pertaining to physical therapy training programs. The period at Gardiner General Hospital was devoted to presentation of the high resistance low repetition exercise program, followed by a round-table discussion.

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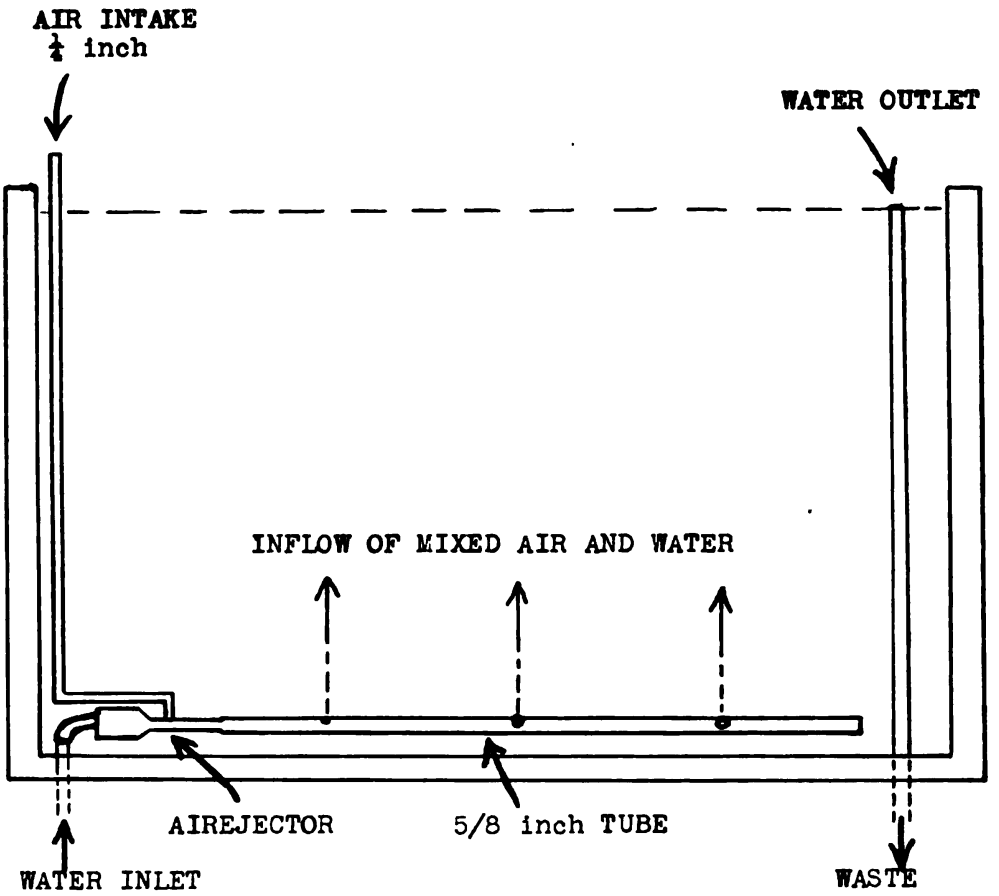
## A SIMPLE AGITATOR FOR X-RAY WASH TANKS

The problem of sufficiently washing x-ray films to remove residual hypo solution is set forth in TB MED 99, 1 October 1944. It is recommended that the tank wash water be agitated by release of compressed air in the bottom of the tank, the air being supplied by a small, rotary-type blower. Major Walter E. Scribner, M.C., at DeWitt General Hospital reports the construction of a less expensive air generator without the use of an electric air blower, and one in which operation depends only on a flow of water.

A pump, filter, airejector type (5½ inches long, with ¼-inch iron pipe male thread) was procured (Med. Dept. Item

No. 4383200). A ¼-inch copper tube, long enough to stand above the tank water level, was soldered over the air intake of the airejector, and a ⅝-inch copper tube, 20 inches long, was soldered to the outlet end. Three holes were drilled, about 8 inches apart, in the top surface of the second copper tube,




the first and second holes (nearest the airejector) being 1/32 inch in diameter, and the third, ¼ inch in diameter. The distal end of the 20-inch tube was pinched and folded to prevent water flow from the tube except through the three holes. The air intake tube was bent and carried to the corner of the tank so that it would not interfere with the handling of films. The water intake end of the airejector was hooked up with the wash tank cold-water line, a valve being put in ahead of the airejector in order to control rate of water and air flow (figure 1).

This agitator can be made quickly at low cost, with little material, the only variant being the length of copper tubes necessary for the particular wash tank in use. Ordinary cast pipe can be used if copper tubing is not available and the water line can be brought into the tank, down a corner, if the tank fittings are not of proper size for the airejector. If longer or shorter wash tanks are so equipped, the air and water out-

let holes may have to be varied from the diameters given above. Several experimental holes will quickly determine the proper size; however, it is best to start with several very small holes, the smallest being nearest the airejector.

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### MODIFIED RING FOR ISCHIAL WEIGHT-BEARING BRACE

The ordinary full ring permits the ischial tuberosity to slide downward and inward to its lowest point, which is at the attachment of the inner upright. This leads to internal rotation of the entire lower extremity, an abnormal gait, vicious stress on the fracture site, and discomfort on weight bearing. The modified ring illustrated here eliminates this factor and the ischial tuberosity rests comfortably even if all weight is removed from the heel seat. It has been developed from an adjustable type of ischial ring devised and employed by Major Charnley of the British 63d General Hospital.

The "bucket" for the ischial tuberosity is constructed from ¼-inch steel rod as follows: The inner one-third of the posterior portion of the ring is horizontal and meets the outer two-thirds at an angle of 45 degrees. The highest portion of the ring, laterally, lies midway between the iliac crest and greater

FIGURE 1

FIGURE 2

FIGURE 3

FIGURE 4

trochanter (figure 1). The uprights are placed behind the mid-points of the ring—at the juncture of the anterior two-thirds and the posterior third (figure 2). This encourages a more secure purchase of the ischial tuberosity on the ring (figure 3). Occasionally, even with accurate fitting, the tuberosity will tend to slip through the ring; this is likely to occur after the patient has been ambulatory for several weeks and his buttocks have become firmer and smaller. In this case the "bucket" is bent forward to hook accurately beneath the tuberosity (figure 4).

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This apparatus was developed by Staff Sergeant Eugene Capaiu and Technician Fourth Grade Virgil Gray under the supervision of Lieut. Colonel Thomas Horwitz and Lieut. Richard G. Lambert of the Orthopedic Section at Vaughan General Hospital, Hines, Illinois.

## LAUNDRY BASKET LINERS

The alternate use of the same canvas laundry baskets, hampers, or other conveyances for the transport of both soiled and clean linen between the laundry and hospital activities is not consistent with proper hospital practices in that it violates isolation principles and jeopardizes the health of the entire hospital community. Clean sheets should be used to line the interior of every truck, basket, or other conveyance before clean linens are loaded therein for transport to wards, clinics, and other places in the hospital. These sheets should remain in the conveyance when soiled linen is transported to the laundry, and when such articles are unloaded the liner sheets should be removed from the conveyance and be replaced by clean sheets before reloading it with clean linen. The cycle should be continued in this manner, thus preventing contamination of the conveyance.

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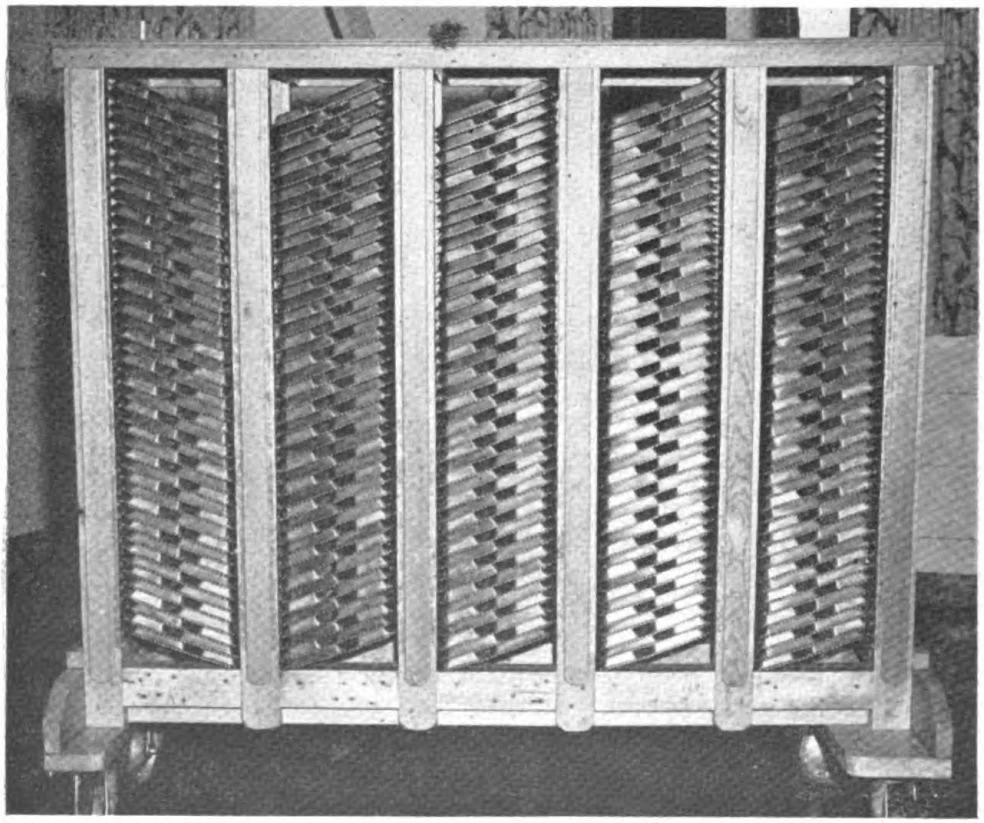
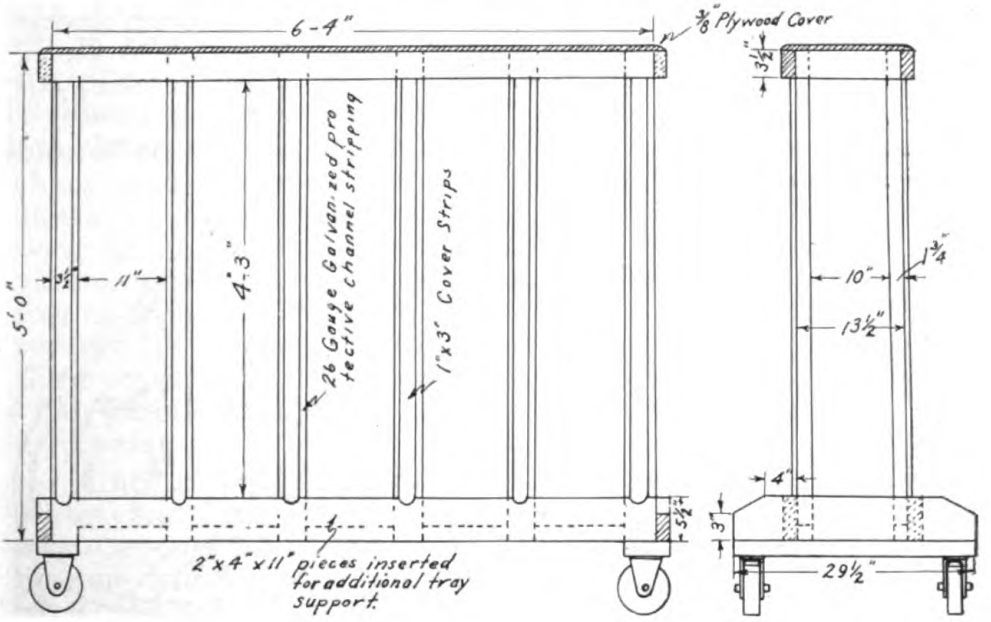
## RACK FOR G. I. TRAYS

The problem of drying and stacking the six-compartment, metal food trays used in a hospital mess at Camp Haan, California, was solved[1] by using a new type of tray rack which has



1. Reported by Captains Alfred G. Reidell and Victor Heiman, and Second Lieut. Constantine A. Kazmierowicz, all of the Sanitary Corps.

no pegs, grooves, dowels, or side strips for supporting the individual trays. The rack is sturdy, simple to construct, neat, and easy to keep clean. Setting the trays at an angle of about 20 degrees permits them to dry much more freely than when laid flat and helps to hold them in the rack. Stacking them alternately with their compartments reversed provides the necessary support for the individual trays, allows for better air circulation, and expedites their handling by the mess personnel.




Finally, providing the rack with casters makes it possible to stack the trays at the sterilizer in the dishwashing room and then to remove them to the pickup place at the "chow line," thus eliminating unnecessary steps in handling them once they have been sterilized.

The illustration shows a rack holding a full load of 230 trays. The rack can be made in any desired size, and possibly of lighter construction. Where continuous feeding of a large number of people is necessary, two racks are desirable, since one can be kept at the serving line while the other is removed to the dishwashing room for reloading.

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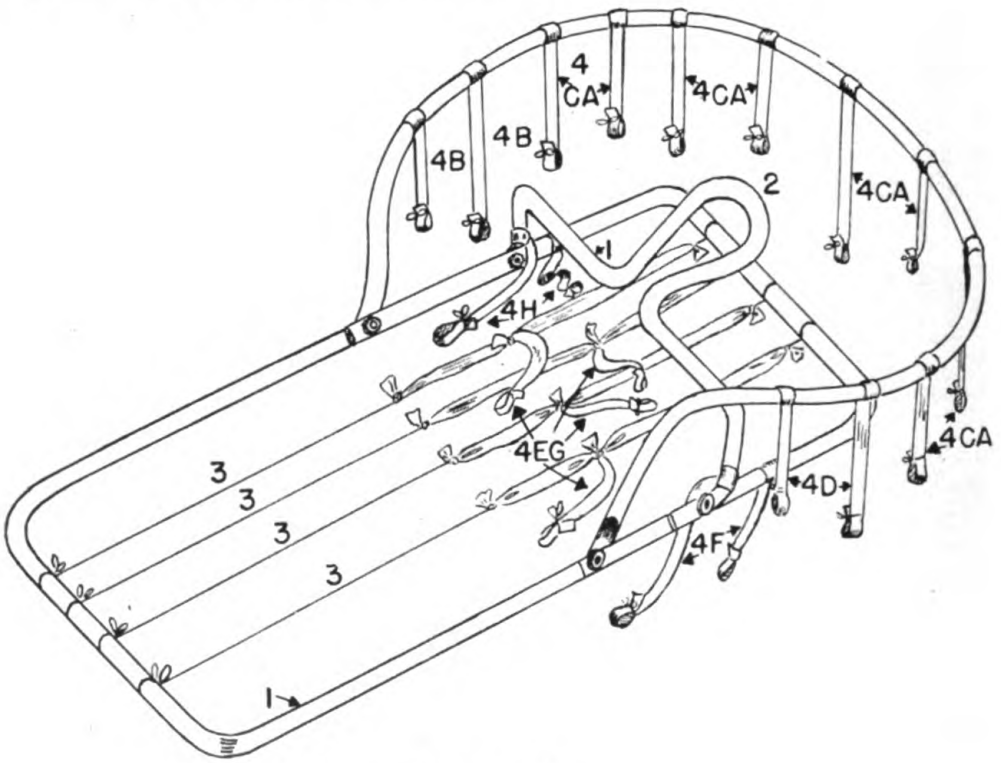
### AN IMPROVISED HAND EXERCISER

A hand exerciser devised in the ETO by Major Clarence H. Rommel, M.C., has been valuable in the mobilization of several hundred stiff and potentially crippled hands. Several exercisers of this type were made to serve the large number of men in need of such treatment. The importance of vigorous, continuous, planned exercise in the treatment of wounds and other injuries of the hands has been well established.

Hollow gas tubing from the camp junk pile was used to make a frame with a base about 12 by 20 inches, a large loop about 20 inches in diameter, and a second smaller loop with projecting "U" about 3 inches in length, as illustrated. Old inner tubes were cut into strips which were then fastened to the metal frame of the exerciser to fit all fingers of the right and left hands. Opposing extension and flexion bands were adjusted to hold the fingers or thumb in about a neutral position. Common white cord ties fix the bands in position and make loops on the end of rubber bands for insertion of the finger tips. The bands are adjustable, parts are easily replaced, and varying degrees of resistance can be produced against each movement by using longer or shorter bands and by shifting position of the hand.




Hand exerciser.

1—Gas tubing frame.
2—Hand rest.
3—Cotton cord supporting rubber bands correcting balance of extension bands. All 4 series are rubber bands (strips of auto inner tubes) looped on ends to enable patient to insert finger tips.
4A and 4C (4AC)—For flexion of fingers of right and left hands.
4B—For flexion of thumb of right hand.
4D—For flexion of thumb of left hand.
4E and 4G (4EG)—For the extension of fingers of right and left hands.
4F—For extension of thumb of right hand.
4H—For extension of thumb of left hand.
Position of hand can be varied to exercise each joint with hand rest as support.

## SWINE ERYSIPELAS

Swine erysipelas, an insidious disease of hogs caused by *Erysipelothrix rhusiopathiae,* is today one of the major problems of the swine industry in the United States. The disease, manifesting itself in three forms—urticarial (diamond skin disease), acute (septicemia), and chronic (arthritic)—and long responsible for tremendous swine losses on the continent of Europe, was first definitely recognized in this country in 1921. While the infection has been most prevalent in the midwestern states, maladies of hogs attributed to the organism *Erysipelothrix rhusiopathiae* have been reported in more than half of the states in this country.

Swine erysipelas is primarily a disease of hogs, but it is also of economic importance in other animals, particularly in sheep and turkeys, and occasionally it occurs in man. The causative agent of erysipeloid gains entrance into the human body through abrasions of the skin. The most susceptible individuals are those engaged in occupations requiring the handling of animals, their by-products, and fish. In the latter case, recovery of the organism *Erysipelothrix rhusiopathiae* from the slime on salt water fish revealed that the erysipeloid known as "fish handler's disease" is due to the causative agent of swine erysipelas.

Until recently, control of the disease in hogs in the United States has been effected through the use of hyperimmune swine erysipelas serum alone. However, since the disease has become widespread and has increased in virulence, the European method of vaccination (hyperimmune serum and live culture vaccine) is being used. The use of this method, however, is restricted to areas where the disease is widespread, and live culture vaccine may then be used only on authority of state livestock officials cooperating with the Bureau of Animal Industry, U. S. Department of Agriculture, in the program for control of the disease. This precaution is taken to prevent introduction of the disease, through the medium of live culture vaccines, into areas where it does not now exist.

Previous treatment of the disease in man has consisted of the intravenous administration and topical application of hyperimmune swine erysipelas serum, as all other remedies, including use of the sulfonamide compounds, have proved ineffective. Penicillin should prove highly effective in the future treatment of swine erysipelas in man and animals as it has recently been found that *Erysipelothrix rhusiopathiae* is very sensitive to the action of this drug. In experiments conducted at the Mayo Foundation, eighty mice, divided into two equal groups, were artificially infected with the causative agent of swine erysipelas. Of the forty animals administered penicillin only two died of the infection, while all the mice in the untreated control group succumbed to the disease.

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From the Veterinary Division, Surgeon General's Office.

### TREATMENT OF CASUALTIES FROM CHEMICAL AGENTS

The new edition of "Treatment of Casualties from Chemical Agents" (TM 8-285), dated April 1945, which is now in process of distribution, includes all of the latest accepted concepts in the treatment of casualties caused by exposure to chemical warfare agents.

Medical officers working with the tactical use of mustard in field installations of the Chemical Warfare Service have observed blister gas lesions on soldier personnel. These lesions have been carefully evaluated for their casualty-producing effects in an illustrated appendix of the manual, entitled, "A Guide for the Disposition of Personnel with Blister Gas Burns." This assessment of lesions comparable to those which may be produced in battle should serve as a guide to medical officers in their initial encounter with vesicant agents.

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### POSTWAR TRAINING OF PHYSICIANS IN PSYCHIATRY

The Council of the American Psychiatric Association is attempting to survey the needs for postwar training of physicians in the field of psychiatry. They are interested in hearing from the men in the armed forces now practicing psychiatry, or who wish to do so, as to their specific interests relative to postwar, postgraduate training. They are interested in determining the type of training that is desired, whether for refresher courses of three months or longer, whether Fellowships for preparation for the American Board examinations, and specific interests such as child guidance, psychoanalytic training, penal or court work, industrial psychiatry, or any other special type.

The Council will appreciate hearing from any of the men in the armed forces with communications addressed to Doctor Winfred Overholser, Secretary, St. Elizabeths Hospital, Washington, D. C.

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### WHOLE MILK FOR PATIENTS ON HOSPITAL SHIPS

A new method of quick-freezing is now making it possible to serve whole milk to wounded soldiers returning from overseas on hospital ships. Although in some cases the milk has been kept frozen for three months, its taste is as fresh as if it had just come from the cow and the bacterial count is lower than in the average milk supply of the average American home. This important addition to the diets on hospital ships resulted from research by the Veterinary Division of the Office of The Surgeon General. Brigadier General R. A. Kelser, director of the division, pointed out that the studies were made because it was known that in countless instances the first request of a hospitalized soldier is for a glass of fresh milk.

About 30,000 pints of frozen whole milk are being shipped

monthly from Charleston and Boston and additional large amounts from New York, New Orleans, San Francisco, and Seattle. While this milk is intended for hospital ships, some of it, when possible, goes to overseas hospitals as well. In addition, 400,000 pints are being shipped monthly to Alaska for the general use of American troops there. Hospital ships previously were dependent, as are overseas troops, on milk made by reconstituting whole milk powder. While the nutritive value of this product leaves nothing to be desired, its taste is never completely satisfactory.

General Kelser said that his research workers found that if milk was frozen slowly there was a tendency for the fat to be thrown out of emulsion and precipitated so that the milk proved unsatisfactory when thawed out. However, if the milk was frozen with extreme rapidity at a temperature of -20° F., it froze in tiny crystals, and as a result, when thawed, it was found to be in its original condition.

It was found that the milk could be satisfactorily frozen in waxed paper containers, twelve of which are placed in a special fiber carton. The whole case is then placed in the freezing unit. During shipment or while in storage the milk is kept at temperatures ranging from 10° to 15°. Twenty-four hours before using, the frozen milk is transferred to an ordinary refrigerator in which the temperature is from 36° to 40°. Here the milk thaws out slowly, which is more desirable.

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Secretary of War Henry L. Stimson, The Surgeon General Major General Norman T. Kirk, and Major General (now Lieutenant General) W. D. Styer, Army Service Forces, aboard a new type of hospital train built for service in theaters of operations. November 1943. Signal Corps photograph.

### THE PATIENT'S OWN CLINICAL PRESENTATION

With frequent changes in ward officers and a large number of patients, to present the patient's clinical story at ward rounds is time-consuming, particularly at inspection. To save time, the Orthopedic Section at Lawson General Hospital about a year ago began having the patient present his own case. It has been found that most of the patients do very well, and reflect a sense of pride in this cooperation.

To initiate the plan the ward is simply called to "attention" and the medical officer announces that each patient's cooperation is currently needed in presenting a short summary of his case when medical officers make the rounds. Patients are requested to give their name, grade, type and location of injury or disease, cause, date, and place of occurrence, with dates and types of operations if they can remember. They are requested to speak slowly, distinctly, and loud enough so that a patient in the opposite bed across the aisle can hear. A demonstration of a hypothetical case is then given. (Private John Smith, compound fracture, right tibia, caused by 88-mm. shrapnel, 8 July 1944, at Salerno, Italy. Closed repair same day. Below-knee guillotine amputation two days later because of gas gangrene. Above-knee reamputation 18 October 1944.)

To be of further help the patients are instructed to have ready on top of their respective x-ray envelopes the first and the most recent x-rays. The ward is then given "at ease" (permitted to sit in chair or lie in bed) as rounds proceed. Some patients require prompting at first but on repetition they soon give a satisfactory clinical presentation. At general inspection where patients trained in this routine may be present for demonstration in occupational therapy and physical therapy departments, clinical stories can be quickly given by the patient on inquiry. This plan of patient presentation is applicable to most orthopedic patients and it would seem, also, to some of the other large patient categories.

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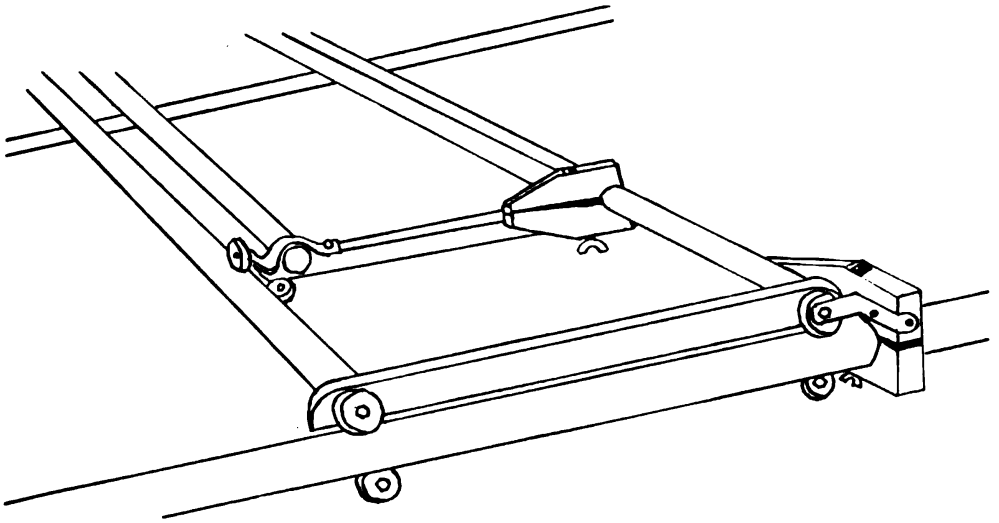
### AWARD OF DISTINGUISHED SERVICE MEDAL

Colonel Florence A. Blanchfield has been awarded the Distinguished Service Medal "for exceptionally meritorious and distinguished service as Superintendent of the Army Nurse Corps."

Colonel Blanchfield, whose home is at Shepherdstown, West Virginia, entered the Army Nurse Corps in July 1917, serving overseas in World War I. She has been assigned to The Surgeon General's Office since 1935. She recommended the establishment of basic training schools for nurses and was responsible for the early assignment of nurses to field and evacuation hospitals near the front lines. Colonel Blanchfield is the first U. S. Army nurse to receive the Distinguished Service Medal in this war although twenty-three were so honored in World War I.

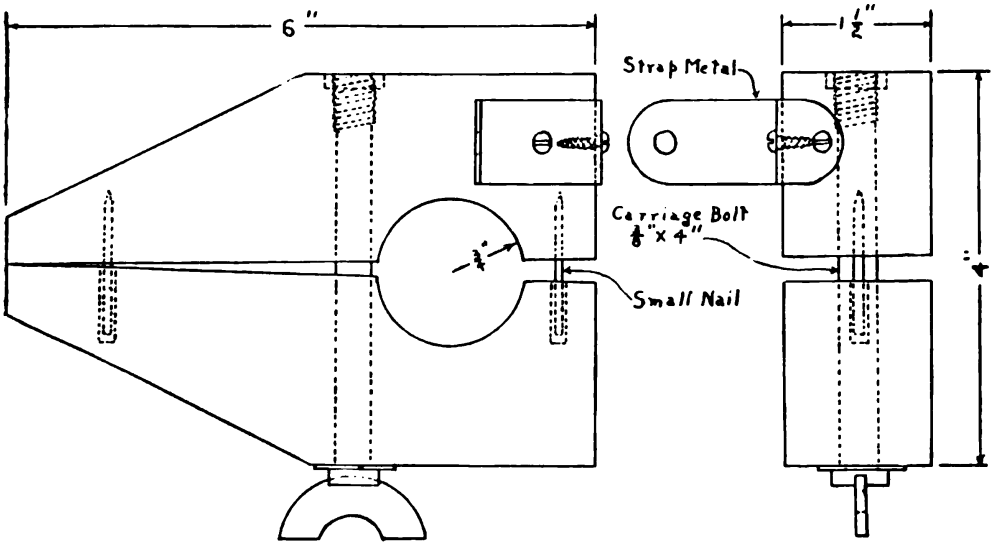
## IMPROVEMENT ON THE FIELD X-RAY TABLE

The field x-ray table (Med. Dept. Item No. 9614500) has its controls for horizontal tube motion on the same side as the tube arm. This is not always convenient because the film cassette is inserted on the opposite side. Private First Class James T. Simpson, Medical Department, suggests that supplemental clamps for arresting transverse and longitudinal tube movement may be added to the opposite carriage rails, permitting adjustment of the tube position from either side of the table. Wooden blocks designed to fit around the longitudinal and transverse table rails can be made to act in this capacity as stops. Such clamps are joined to the carriage assembly with pieces of strap metal obtained from the banding strips on shipping boxes.



Perspective showing clamps in place on table.

Details of this arrangement are shown in the illustrations.




Detail of clamp for arresting longitudinal motion.

The advantages of this modification are: (1) It allows control of the x-ray tube from the same side as that on which the film cassette is inserted. This is usually the more convenient working side of the table. (2) It adds a second set of arresting stops for x-ray tube movement so that the technician can operate the table as well from one side as from the other.

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## COLLECTION OF RODENT SPECIMENS

Remington Kellogg, curator, Division of Mammals, United States National Museum, reports that accurate information on the occurrence of specific kinds of rodents and other mammals has been found to be either inadequate or lacking for many parts of the world during the present global conflict. For example, there are said to be 7,083 islands in the Philippine archipelago, and before the beginning of the present war, specimens of rats and mice had been forwarded to museums from only 24 of the Philippine Islands. There are at least sixty-one recognizable kinds of rats and mice on these 24 islands. Whether or not the other islands have an equally interesting variety of rodents can be determined only by the preparation of study skins and skulls.

The six main Micronesian archipelagoes in the Pacific comprise some 700 atolls and volcanic islands. Most of the atolls consist of a number of smaller islands and reefs. From this Micronesian region stretching some 2,000 miles across the Pacific and comprising the Palau, Caroline, Bonin, Marianas, Marshall, Gilbert, and Ellice groups of islands, information regarding the rats and mice is available for only 23 atolls and islands. Our knowledge of the rodents that occur in the Polynesian region on the 13 island groups, comprising some 246 volcanic islands and 121 atolls and extending from the Hawaiian Islands to Samoa and eastward to Pitcairn Island, is equally incomplete, although a relatively small number of specimens have been collected during the past one hundred years on about 50 of these islands.

At present, we have rather limited information regarding some of the rodents on 152 of the 12,000 or more islands in the Pacific, exclusive of those in the Melanesian region, the Dutch East Indies, and the South China Sea. Collection of specimens in adjacent regions will provide more precise information regarding the distribution of mammals more or less closely related to the Pacific insular species.

Consequently, specimens of mammals that are captured in the course of investigations by epidemiology, malariology, and rodent-control units should be prepared for subsequent identification in accordance with instructions mentioned in War Department Circular No. 277, dated 5 July 1944, and forwarded to the Director, Army Medical Museum, Washington 25, D. C. As stated in AR 40-310, Change 1, dated 3 July 1944,

arrangements have been made whereby the skins and skulls of mammals will be identified and deposited in the Division of Mammals, United States National Museum. Such specimens thus become the basis for subsequent studies relating to geographic distribution. Specimens of mammals thus deposited will provide also a record of all investigations by members of epidemiology and malariology units of mammals involved in the transmission of disease.

Adequate documentation is the basis of all research; this is particularly true in connection with animals involved in the transmission of disease. The accurate identification of the hosts and the parasitic or commensal vectors requires in most instances consultation with specialists in these groups. Furthermore, accurate identification of specimens of mammals (assumed or known to be involved in the transmission of a disease) can be made only by direct comparison by a competent specialist with determined material in a museum collection. Much of the investigative work previously conducted by epidemiology parties in different parts of the world is practically worthless so far as the mammals are concerned, because of the casual attitude taken by many investigators with respect to the accurate identification of the mammalian hosts.

## NATIONAL INSTITUTE OF HEALTH RESEARCH FELLOWSHIPS

The U. S. Public Health Service announces the creation of National Institute of Health research fellowships, after 1 July 1945. The junior research fellowships will be available to those holding masters' degrees in the sciences—physics, chemistry, entomology, etc.—allied to public health, from an institution of recognized standing. The stipend will be $2,400 per annum. The senior research fellowships will be available to those holding a doctorate in one of the sciences allied to public health. The stipend will be $3,000 per annum.

These fellowships will offer an opportunity for study and research in association with highly trained specialists in the candidates' chosen fields at the Institute or some other institution of higher learning. Letters of inquiry should be addressed to the Director, National Institute of Health, Bethesda 14, Maryland.

## LAUNDRY TRUCK TUBS

The trucks used for the transport and storage of wet laundry between the wash machine and the extractor should be thoroughly cleaned frequently because of the formation of a slimy scum between the grate and bottom of the truck. This scum is an ideal host for bacteria and provides an excellent agency for the transfer of pathogenic microorganisms. The wood grate should be removed and the tub truck placed on end. Both the grate and the truck should be flushed with scalding water once each week. Box trucks used for the transport

and storage of both damp and dry work during the finishing processes should be kept clean and wholesome and should not be used alternately for clean and soiled work. Trucks required in the contaminated areas of the plant should be properly identified and permanently assigned to those locations. These trucks should be scalded or scrubbed with soapy water once each week.

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## PROCUREMENT OF SURPLUS MEDICAL SUPPLIES BY VETERANS

The new veteran priority ruling gives veterans who operate a small business or enterprise the right to purchase surplus property direct from the Government through the Smaller War Plants Corporation, rather than buying through regular dealers. A small business or professional enterprise is defined as "any commercial, industrial, manufacturing, financial, service, legal, medical, dental, or other lawful enterprise (other than agricultural) having an invested capital not in excess of $50,000, which a veteran maintains or desires to establish: *provided*, That he is or will be, directly or indirectly, the sole proprietor thereof or that no person or persons, other than other veterans, have or will have any proprietary interest in the enterprise, singly or together, directly or indirectly, in excess of 50 percent of either the capital invested in such enterprise or of the gross profits or income thereof."

The procedure for procuring surplus supplies and equipment by veterans was established in Surplus Property Board Regulation, dated 26 May 1945, certain paragraphs of which are especially applicable to doctors and dentists who are veterans and who may desire to purchase surplus supplies and equipment to establish themselves in their profession. The Smaller War Plants Corporation at present has district offices in some 97 of the larger cities in the United States. At present, there is no indication of the extent to which medical and dental supplies and equipment will be available to doctors and dentists on their release from active duty. Surplus lists will be screened for other Federal agencies before becoming available to veteran doctors and dentists.

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**The Army Veterinary Corps** is inspecting daily (as of 10 June) between 23,000,000 and 25,000,000 pounds of meat, meat-food, and dairy products, the primary purpose of such inspection being to ensure protection of the health of the American soldier. The Veterinary Corps includes 2,150 officers and about 5,000 technicians, the larger percentage of whom serve as inspectors. As an example of the thoroughness and effectiveness of this inspection, it has made possible the serving of fresh milk in all Army camps in this country during the present war. In World War I, canned milk was used in Army camps in this country. In spite of the tremendous requirements for dried milk powder for overseas use, the fresh milk supply for troops in this country has averaged a little over one-half pint per man per day.

### INCISION FOR EXPOSURE OF PERONEAL NERVE AT KNEE

The conventional incision along the course of the peroneal nerve at the knee has two serious shortcomings: (1) the wound crosses the flexor surface of the popliteal space, causing a scar that may lead to contracture; and (2) the wound is difficult to close with the knee flexed. These objections are avoided, Lieut. Colonel Frank H. Mayfield, M.C., reports, by an S-shaped in-

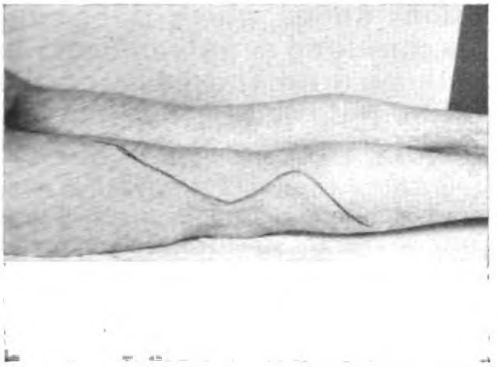

FIGURE 1. Showing outline of skin incision with leg straight.

FIGURE 2. Showing wound after closure; suture line on lateral aspect of leg.

cision which begins over the posterior aspect of the thigh and extends lateralward toward the condyle of the femur, then medialward over the calf, and again lateralward to cross the fibula 3 and 4 inches below the knee (figures 1 and 2). By undermining the flaps, excellent exposure is obtained. Approximation of the wound edges is then accomplished with ease, even though the knee is acutely flexed.

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### WAR EMERGENCY COURSE IN OCCUPATIONAL THERAPY

One year ago the War Department established a War Emergency Course in Occupational Therapy in order to meet the critical shortage of this type of personnel in Army hospitals. By recruiting college graduates with a background of arts and crafts, it was possible to shorten the training course from the prescribed sixteen months to twelve months, covering only the medical subjects and the theory and application of occupational therapy. Eight accredited civilian schools of occupational therapy and thirty-four Army hospitals cooperated in giving the four months' theoretical course and eight months' clinical training outlined to train a total of 700 students. On 1 July 1945, the first 92 students of this course graduated and were assigned to 50 Army general and convalescent hospitals in the United States. There are 458 additional students at various stages of their clinical training in hospitals, and the remaining 150 students are enrolled in schools. By July 1946, a total of about 1,000 registered occupational therapists will be on duty with the Army.

## LAUNDERING ELASTIC BANDAGES

Laundering cotton elastic bandages requires special care. In some instances the bandages have been sent to hospital laundries, where caustic soda is used in the solutions and where little care is taken in ironing. Consequently, the bandages have been returned heavily impregnated with alkali, their elasticity practically destroyed, and the fabric deteriorated. A representative of a large manufacturer of elastic bandages has investigated conditions under which the bandages have been laundered and has consulted supply officers in the amputation centers. His findings form the basis of the following directions, which should be followed in the laundering of all-cotton elastic bandages:

1. Separate the clean bandages from those contaminated with blood, pus, or other material. The contaminated bandage should be soaked in a fairly strong solution of cresolin or autoclaved to sterilize the material prior to laundering.

2. Each bandage should then be carefully folded upon itself to make a bundle about 10 inches in length. Several, but not more than four, bundles may be tightly tied together with a string. Twelve to twenty-four of these bandage packages are to be put into a laundry net and fastened with a large safety pin.

3. The bandages are washed in a solution consisting of two-thirds neutral soap and one-third metasilicate. This solution has a pH of 10.2 to 10.8; any solution which has a pH higher than this value (i.e., more alkaline) will shorten the life of the cotton fabric.

4. The soap solution is thoroughly removed from the bandages by three separate rinses in warm water.

5. Instead of attempting to extract all of the water by tumbling, about 60 percent of the water is removed by centrifugation while the bandages are still in the laundry net. The bandages are then removed from the net and spread out to dry on a flat surface. After the bandages are dried they are rolled firmly, ready for use.

The foregoing directions can best be followed when the amputation center launders its own bandages. Therefore, two Bendix washing machines have been sent to each amputation center. If the bandages are laundered in accordance with these directions, they will maintain their usefulness for a minimum of forty to forty-five launderings.

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**General Denit Awarded Legion of Merit.**—General MacArthur, by direction of the President, has awarded the Legion of Merit and the Bronze Star Medal to Brigadier General Guy B. Denit, Theater Surgeon, U. S. Army Forces in the Far East, and Chief Surgeon of U. S. Army Services of Supply, Southwest Pacific Area. The Legion of Merit citation mentions General Denit's work up to the time of the Leyte invasion, including operation of medical service for five new major bases and the establishment of 24 general and station hospitals as well as numerous smaller ones and supply depots. The Bronze Star order cites General Denit's contribution at Leyte in exercising "sound knowledge, capable leadership, excellent judgment and untiring efforts" in handling medical service for that amphibious landing. He personally supervised the prompt care and evacuation of battle casualties and hospitalization.

## SCHICK TEST CONTROLS

A comparison of the amount of Diphtheria toxin, Schick test (Med. Dept. Item No. 1603000), and Diphtheria toxin, Schick test control (Item No. 1603100), issued to the Army during 1943, 1944, and 1945 to 20 April shows that 1.5 vials of the former have been issued for every vial of control material. This ratio of issues has been constant and indicates that about one-third of the Schick tests in the Army are made without a control.

The Schick test is subject to several common errors, some leading to false positive and some to false negative interpretations. Use of old or improperly stored test material of reduced potency, early interpretation with omission of the reading on the fourth or fifth day, and failure to use a control are the commonest errors. Even though pseudoreactions have usually passed their peak and begun to fade by the fourth day, accurate differentiation of pseudo-, combined, and positive reactions cannot be made without a control. If it is decided that Schick testing is indicated in a given situation, it should be done and read properly, always including a control.

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## RECONDITIONING OF STORED FORMALIN[1]

For tissue examination no fixative has yet replaced the standard 10 percent dilution of formalin for routine use. However, a stock solution of formalin, on standing, frequently becomes cloudy, especially in the cold, and this precipitate consists of a mixture of several polymers of formaldehyde. The clarity of stock formalin solutions is not especially related to the purity of the product. The rate of precipitation or turbidity is directly proportionate to lowering of temperature and to age. In examining several batches of such milky formalin, the author constantly found the amount of formalin to be well below the labeled strength of 37 percent. Obviously, a 10 percent dilution of such supposedly full-strength formalin is considerably below the intended fixing strength, and thus, the rate and effectiveness of fixation are reduced.

The author has readily accomplished complete reconditioning of such formalin by using heat and pressure in a steam autoclave. The milky stock formalin is shaken up to resuspend any sediment and then poured into screw-topped mason jars with rubber gaskets and tightly sealed. Autoclaving at 15 pounds' pressure for a minimum of thirty minutes produces a water-clear transformation. This is cooled to room temperature before the 10 percent dilution is prepared for use. The author states that the stock solution may be stored on the shelf for months and that he has seen no turbidity develop in cold storage of reconditioned formalin for over four months.

1. Abstract of paper by Major Reuben Cares, M.C., A.U.S., of the 7th Medical Laboratory, submitted for publication through The Surgeon General's Office to the Journal of Technical Methods; Bulletin of the International Association of Medical Museums.

### BRIGADIER GENERAL EARL MAXWELL

Brigadier General Earl Maxwell, surgeon of the South Pacific Base Command and formerly surgeon of the South Pacific Area, was born in Illinois in 1904. He graduated from Washington University School of Medicine, St. Louis, Missouri, and entered the Medical Department of the Army as first lieutenant in the Medical Reserve in 1928, graduating from the Army Medical School in 1930. Among other places, he has served at the Gorgas Hospital at Ancon; as chief of Eye, Ear, Nose, and Throat Service and assistant base and flight surgeon at the station hospital, Barksdale Field, Louisiana; as laboratory officer, Station Hospital, Fort Leavenworth, Kansas; and as base surgeon and sanitary inspector, Army Air Base, Savannah, Georgia. He is a graduate of the Medical Field Service School, Carlisle Barracks, Pennsylvania, and the School of Aviation Medicine, Randolph Field, Texas, and has a flight surgeon rating. He has been awarded the Air Medal and the Legion of Merit and attained his present rank in January 1944.

Brigadier General Earl Maxwell

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### NEW TECHNICAL MANUAL ON ROENTGENOLOGY

Outstanding in the Medical Department's instructional aids in the new manual "Military Roentgenology" (TM 8-280), which contains more than 200 x-ray plates, each revealing the photographic gradations of basic roentgenographic positioning, and each accompanied by an exposure schedule, a photograph of proper x-ray tube placement relative to the patient, and an anatomic diagram of the path of the x-rays. Of value to the roentgenographic technician are the illustrated chapters

on roentgenographic physics, photography, care and operation of equipment, and physiology. The manual contains also special techniques of foreign body localization and an appendix of darkroom hints, electrical system diagrams, and pertinent tables.

The Medical Department is indebted to The Adjutant General's Office for cooperation in making this manual an outstanding revision of the previously existing technical manuals on this subject. The distribution of the manual is such that it will reach personnel concerned with the use and operation of Army x-ray equipment.

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### INDEXES OF ARMY PUBLICATIONS COMBINED

With the May edition, the Army combined its two major indexes of publications to provide a more complete and efficient listing service for the field. The new field manual, FM 21-6, entitled "List and Index of War Department Publications," will be published monthly, as heretofore, and distributed down to companies. The consolidated list and index of publications contains all the listings that formerly appeared in War Department Pamphlet 12-6 and Field Manual 21-6. Of special interest to maintenance personnel is the fact that they can now find complete listings of manuals, circulars, bulletins, orders, forms, and the like between the covers of a single, up-to-date, monthly manual. Among many publications listed in the new FM 21-6 are field manuals, technical manuals, technical bulletins, supply bulletins, lubrication orders, modification work orders, and maintenance forms.

An important feature of FM 21-6 is that new publications are indicated by an asterisk (*), making it easy for an organization to check once a month to assure that it has on hand, or receives, the latest authorized publications.

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Laboratory buildings of the Special Commission on Scrub Typhus, located in Doboduru, New Guinea (1943).

## AWARD OF TYPHUS COMMISSION MEDAL

The War Department has recently announced the award of the Typhus Commission Medal to the following:

Captain Byron L. Bennett, A.U.S., Boston.
Colonel Eugene W. Billick, M.C., Monongahela, Pennsylvania.
Colonel Harry A. Bishop, M.C.
Captain Thomas J. Carter, U.S.N.
Lieut. Colonel H. D. Chalke, Assistant Director of Hygiene, Royal Army Medical Corps (British).
Lieut Colonel Emory C. Cushing, Sn. C., Arlington, Virginia.
Captain Edward Harvey Cushing, M.C., U.S.N.R.
Major William A. Davis, M.C., New York.
Major Robert S. Ecke, M.C., Brooklyn.
Dr. Alexander G. Gilliam, senior surgeon, United States Public Health Service.
The Honorable Alexander Comstock Kirk, Ambassador to Italy.
Lieut. Commander William B. McAllister, Jr., U.S.N.R., Cleveland.
Lieut. Colonel Edward S. Murray, M.C., Cedar Rapids, Iowa.
Colonel Harry Plotz, A.U.S., Brooklyn.
Lieut. Colonel John Crayton Snyder, A.U.S., New York.
The Honorable Laurence A. Steinhardt, Ambassador to Turkey.
Dr. Fred L. Soper, field staff member of the International Health Division of the Rockefeller Foundation.
Major Charles M. Wheeler, A.U.S., Brea, California.
Lieutenant Stafford M. Wheeler, M.C., U.S.N.R. (posthumous).
Colonel William L. Wilson, M.C., Washington, D. C.
Major Theodore E. Woodward, A.U.S., Westminster, Maryland.
Lieut. Commander Andrew Yeomans, U.S.N.R., Brookline, Massachusetts.
Major Chris J. D. Zarafonetis, M.C., Grand Rapids, Michigan.

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## AWARDS OF MERITORIOUS SERVICE UNIT PLAQUE

Under the provisions of Section I, Circular No. 345, War Department, 1944, the following medical units have been awarded the Meritorious Service Unit Plaque.

2d Medical Laboratory.
4th Medical Battalion.
7th Medical Battalion.
20th Station Hospital.
51st Field Hospital.
120th Medical Battalion, Clearing Company.
222d Station Hospital.
315th Medical Battalion.
325th Medical Battalion.
326 Airborne Medical Company.
382d Medical Collecting Company.
383d Medical Collecting Company.
449th Medical Collecting Company.
451st Medical Collecting Company.
501st Medical Collecting Company.
684th Medical Collecting Company.
2d Medical Battalion.

Along with each award is a story of superior performance of duty under adverse conditions, of superior medical care of casualties, of heroic deeds, and outstanding devotion to duty. It is regretted that space is not available to publish these citations in full.

## AWARD OF THE SILVER STAR

The War Department has announced the award of the Silver Star to the following Medical Department personnel:

Staff Sergeant Daniel L. Alley, of Conroe, Texas.
Staff Sergeant Elmer J. Montee, of Gypsum, Kansas.
Staff Sergeant Edward N. Wilkerson, of Lowell, North Carolina.
Technician Third Grade Herman C. Spivey, posthumous.
Sergeant Robert J. Madden (then private first class), of Pittsburgh, Pennsylvania.
Technician Fourth Grade Neil H. Adams, of Kanab, Utah.
Technician Fourth Grade Charles A. Fritschler, of Milwaukee, Wisconsin.
Technician Fourth Grade Frank X. Gorniak, of Jamaica, New York.
Technician Fourth Grade Clifford L. Hanson, of Saint Anthony, Idaho.
Technician Fourth Grade Harold J. O'Connor, posthumous.
Technician Fourth Grade Joseph R. Simkewicz, posthumous.
Corporal Stewart H. Boelsen, of Kansas City, Missouri.
Technician Fifth Grade Charlie N. Bailey, of Clyde, Texas.
Technician Fifth Grade David N. Brewer, of Jeffs, Virginia.
Technician Fifth Grade Leon M. Brown, of Pearl, Texas.
Technician Fifth Grade Charles S. Fields, of Coeur d'Alene, Idaho.
Technician Fifth Grade Joseph N. Gomez, of Gallup, New Mexico.
Technician Fifth Grade William W. Morris, of Green City, Missouri.
Technician Fifth Grade Albert A. Rendler, of Mount Vernon, New York.
Technician Fifth Grade Henry M. Searcy, of Fayetteville, North Carolina.
Private First Class John V. Banse, of San Antonio, Texas.
Private First Class William J. Boutwell, of Beaumont, Mississippi.
Private First Class Daniel J. Capano, posthumous.
Private First Class Wilson S. Hawk, of Effingham, Kansas.
Private First Class Edward W. Mackowski, of Chicago, Illinois.
Private First Class John L. McNeill, Jr., of San Antonio, Texas.
Private First Class Cleburne H. Schmidt, of San Antonio, Texas.
Private First Class Raymond K. Thorsen, of Bridgeport, Connecticut.
Private James E. Allen, of Skiatook, Oklahoma.
Private Arthur C. Archambeault, of Manchester, New Hampshire.
Private David B. Arndt, of Owatonna, Minnesota.
Private Urbine A. Bailey, of Springton, West Virginia (with Oak-Leaf Cluster).
Private Arthur H. Berkoben, of New Kensington, Pennsylvania.
Private Matt Carragher, posthumous.
Private Loyd L. Cary, posthumous.
Private Joe W. Hazher, of Des Moines, Iowa.
Private Louis J. Kline, posthumous.
Private Charles M. Lanier, of Thomasville, North Carolina.
Private Harry W. Martin, Jr., posthumous.
Private William R. Millen, of Kings Mountain, North Carolina.
Private Elmer V. Shepherd, of Bronx, New York.
Private Charles L. Tester, posthumous.
Private Harold O. Turner, of Lynn, Massachusetts.
Private Carl T. Welch, of Terre Haute, Indiana.
Private Hilton M. Whidden, of Pineland, Florida.
Private Craig L. White, of Kansas City, Missouri.

## HEATING AND VENTILATION PROGRAM FOR THE CONSERVATION OF FUEL

The critical shortage of coal and fuel oil in continental United States has led to the publication of War Department directives on the conservation of fuel (W.D. Circulars Nos. 324 and 406, 1944; TWX 6 January 1945). This shortage of fuel continues and probably will be more acute during the next winter. The proper heating and ventilating of buildings has a direct bearing on the health and comfort of troops; hence, in any plan for the conservation of fuel, these two factors must be considered.

It has been thought that one of the best methods of preventing air-borne diseases in barracks was by ventilation. This was based on the theory that by introducing fresh air the bacterial content of the air in the barracks was decreased; hence, the more air the less spread of disease. Recent studies on the spread of air-borne infections, however, indicate that, except in cases of wholly inadequate ventilation, the proper spacing of individuals in barracks is as important as ventilation and that no amount of overventilation can compensate for overcrowding. In fact, during cold weather excessive ventilation at night, when the heat is off, frequently leads to chilling of the sleeping men, which is undesirable. Fuel is wasted when attempts are made to keep the barracks heated to 65° despite the rapid turnover of air.

The majority of barracks now in use are of the mobilization and theater-of-operations types. Because of the materials used and the open type of construction, there is considerable infiltration of air through the outer walls and through openings around windows and doors. In cold weather with moderate winds, this infiltration of fresh air may alone be sufficient for ventilation purposes in such barracks without opening any windows. Under conditions of little wind, this ventilation by infiltration will have to be supplemented by open windows or built-in ventilators.

In planning a heating and ventilating program for a post, there should be close coordination between the post surgeon and the post engineer. A program of heating, based on the daily schedule of troop activity, should be outlined for the various buildings—such as barracks, latrines, mess halls, classrooms, theaters, and offices—to ensure that they are heated to the proper temperature during the hours they are occupied. This temperature will vary, depending on the activity of the men, the amount of clothing being worn or, at night, the amount of bed covering available. Heating of buildings to temperatures above 72° is never necessary in living and working quarters.

While the heating system is in operation, the scheduled temperatures should be maintained as accurately as possible,

From the Preventive Medicine Service, Surgeon General's Office.

because an excessive temperature means waste of fuel and a lowered temperature may cause chilling of personnel. Excessive temperatures should be avoided by reducing the heat rather than by overventilation.

During the hours that the fires are banked, or allowed to die out, body heat must be maintained by adequate clothing or bed covers. During this time overventilation may cause chilling. There is no simple mechanical means for determining the adequacy of ventilation in a room; however, it should be sufficient to provide freedom from stale, or body, odors and a sense of well-being for the occupants.

No hard and fast rules (see AR 40-205) on the amount of window ventilation can be applied throughout a service command, because conditions vary with the location of a camp and even within a single camp area. However, it should be possible for the post surgeon and post engineer to develop a program suited to the location, the type of buildings, and heating facilities. The maximum conservation of fuel with full protection of the health of troops will result from such a coordinated program of heating and ventilation.

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**Monthly Medical Meeting.**—At the regular meeting of officers of the Medical Department in the District of Columbia and vicinity, Army Medical Center, 21 June, Major General Norman T. Kirk, The Surgeon General, presided. Lieut. Colonel O. A. Kilpatrick discussed "Psychiatric Aspects of Reconditioning"; Captain T. A. Callahan, "Arrow Poison in Use by North Burma Tribesmen"; Major M. G. Lynch, "Cancer of the Larynx"; and Major L. H. Mousel, "Postoperative Pulmonary Complications."

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Brigadier General John A. Rogers, surgeon, First U. S. Army, directing Major General Walter Scherf, surgeon of German Army group B in regard to the care and treatment of captured enemy wounded in enemy hospitals. Major General Scherf was captured at Lennep, Germany.

## RECENT DIRECTIVES AND PUBLICATIONS

**This list is intended as only a brief reference to the items mentioned. Before acting on any of them, the original communication should be read. Request for copies, when made, should be directed to the source of the communication through proper channels.**

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| WD Circular No. 105<br>4 Apr. 45<br>Sect. I | Line of Duty. Certain commanding officers are authorized to permit military personnel to engage in essential industries or agriculture under conditions specified during normal off-duty periods or while absent on pass, leave, or furlough. Injuries incurred in work in furtherance of national interest under prescribed circumstances will be considered to have been incurred in line of duty. Rescinds several directives on same subject. |
| WD Circular No. 105<br>4 Apr. 45<br>Sect. II | Hospitalization. Makes provisions re composition and function of hospital centers. Provides that a single hospital subsistence account and a single post hospital fund will be maintained which will serve all hospital facilities administered under the center headquarters. |
| WD Circular No. 106<br>4 Apr. 45<br>Sect. I | Morning Report. Provides that reason for separation need not be stated on morning reports of separation centers and A.S.F. hospitals, when separation is result of discharge or relief from active duty. |
| ASF, Headquarters<br>Circular No. 129<br>11 Apr. 45<br>Part II, Sect. IV | Medical Corps Officers. When, in opinion of commanding officer of A.S.F. medical facility authorized to classify officers for general or limited service, a Medical Corps officer of his staff should be reclassified from general to limited service, such officer is to be ordered to the nearest A.S.F. hospital having such physical reclassification authority, other than the hospital to which he is currently assigned. |
| WD Circular No. 117<br>14 Apr. 45<br>Sect. IV | Malaria. Sets forth instructions, responsibility, organization, training, and programs for malaria control. Rescinds W. D. Cir. No. 223, 1943. |
| WD Circular No. 117<br>14 Apr. 45<br>Sect. VI | Previous Employer Card (WD, AGO Form 519). Use of such form is mandatory at separation centers, hospitals, and other installations with authority to discharge. Form to be mailed to previous employer of each person discharged or relieved from active duty. |
| ASF, Headquarters<br>Circular No. 135<br>16 Apr. 45<br>Part II, Sect. III | Hospital Center (ZI). Defined as a medical installation under one command but with two or more separate components such as a general and convalescent hospital. Commanding officer of center is responsible for operation of all components of center. Operation and technical administration of center to be responsibilities for which center commanding officer will report direct to commanding general, service command. Attaches standard organization chart for hospital center. |
| WD Circular No. 121<br>19 Apr. 45<br>Sect. III | Travel. Provides that where indigent, mentally incompetent officer or officer prisoner is being transported, an officer escort is required. Travel expenses may be paid by escorting officer and reimbursement secured under AR 35-7120. |
| AR 40-2090<br>28 Apr. 45 | Tetanus. Horses. Changes par. 12, AR 40-2090, 15 Sept. 1942. All Army horses and mules to be immunized against tetanus in accordance with instructions set forth. |
| WD Circular No. 134<br>4 May 45<br>Sect. VI | Metycaine. Will no longer be employed in any form in Army hospitals. |

From the Legal Division, Surgeon General's Office.

ASF, Headquarters
Circular No. 160
4 May 45
Part II, Sect. III

Publication. No echelon of A.S.F., except Provost Marshal General, will print any pocket-sized safety rule books, safety handbook, or other safety publications designed for use of civilian employees engaged in A.S.F. industrial operations.

AR 35-6640
16 Apr. 45

Property. Sets forth complete regulations re accounting for lost, damaged, and destroyed property.

WD Circular No. 138
10 May 45
Sect. III

Immunization Record. Provides that recording of blood group will be made on WD, AGO Form 8-117. Rescinds par. 17a, WD Pamphlet 8-5, and provides that certain information re spectacles will be recorded on WD, AGO Form 8-117.

WD Circular No. 141
12 May 45
Sect. I

Maternity Care. Women honorably discharged or relieved from active duty because of pregnancy are eligible for maternity care during pregnancy and for outpatient postnatal care at any Army medical installation when practicable and where suitable facilities are available. Surgeon General has designated hospitals listed where suitable facilities are available.

WD MEMO 605-45
20 Apr. 45

Army Retiring Boards. Officers appearing before and placed on terminal leave by such boards will be advised in writing that any arrangements by officers for return to civilian life should be made on tentative basis because board proceedings must be approved in War Department, and, if disapproved, officers may be ordered to appear before reconvened Army retiring board which might necessitate recalling officers to active duty.

WD Circular 123
24 Apr. 45
Sect. VII

Medical Officers. Sets forth text of J.A.G. Opinion holding that when treatments and duties with respect to either military personnel or civilians are administered and performed by medical officers of the Army in compliance with valid orders issued pursuant to lawful Federal authority, such medical officers are not legally subject to the provisions of state laws respecting the licensing of physicians, regardless of whether the treatments and duties are administered and performed on or off a military reservation.

WD Circular No. 144
16 May 45
Sect. V

Medical Department Officers. Establishes standards and requirements of minimum training and physical status governing assignment of officers to each corps of Medical Department; such standards to apply to permanent assignments to zone of the interior, to casual shipments to overseas theaters, and to assignments to units destined for overseas.

ASF, Headquarters
Circular No. 182
23 May 45
Part II, Sect. I

Army Retiring Board. Provides that, in all cases where board action results in officer's relief from active duty, two copies of relief orders will be forwarded with board record to The Adjutant General through channels.

ASF, Headquarters
Circular No. 174
17 May 45
Part I, Sect. II

Refresher Professional Training. Available to Medical Corps or Sanitary Corps officers (qualified by previous training and experience as laboratory officers) who are to be assigned to laboratory duty and who have not been engaged in professional laboratory service for past 12 months. Requests for such training to be submitted through channels to The Surgeon General.

WD Circular No. 164
4 June 45
Sect. V

Tax. Provides that military and civilian personnel of War Department traveling under proper orders may be reimbursed for cost of transportation taxes paid from private funds, provided travel is performed in a transportation and per diem status and provided Government transportation requests were not available.

# The Chemotherapy of Schistosomiasis Japonica

There has been no thorough study of the chemotherapy of the disease due to *Schistosoma japonicum*, especially none in which modern pharmacologic techniques have been applied or adequate follow-up studies performed. Present dosages are recommended on an empirical basis; the relative efficacy of the drugs employed is undetermined; and the ultimate value of treatment is uncertain. Indeed, in statistical terms the natural course of the disease is poorly defined, in that only vague ideas exist as to what proportion of patients develop serious disease and what proportion escape significant damage, following infection on one or a few occasions.

According to published reports, in the last twenty-five years a large majority of patients with schistosomiasis japonica have been treated with antimony and potassium tartrate (tartar emetic) or with fuadin. A few patients have been given antimony and sodium tartrate, neostibosan (or related compounds), or emetine. Antimony and sodium tartrate[1] is even more unstable than tartar emetic and is believed to possess no advantage over the potassium salt. Neostibosan and other available pentavalent antimonials appear to be relatively ineffectual. Emetine cannot be given with safety in sufficient dosage to be effective. Lithium antimony thiomalate (anthiomaline) has been used in other forms of schistosomiasis, but no published report has been found of its use in the Japanese variety. Preliminary reports of its experimental use are not encouraging. Only in the case of tartar emetic and fuadin does available knowledge offer a reasonable basis for general therapeutic recommendations.

All of the drugs used in the treatment of schistosomiasis have serious toxic potentialities; however, the early use of chemotherapy for this disease is imperative, unless the presence of another serious disease contraindicates it. Moreover, while dosages must be within safe limits, small dosages may be the cause of therapeutic failure. Antimonial drugs should always be given with care and the reactions of patients to their administration should be closely observed. Injections should always be made slowly. Among the possible toxic effects are depression of the circulation and respiration, and irritation of the central nervous system, liver, and kidneys. Nausea and vomiting are relatively common and rarely serious. Coughing may be immediately associated with the injection of tartar emetic; it is not important. Other symptoms include stiffness or pain in joints and muscles, sense of constriction of the chest, pain in

1. Antimony and sodium tartrate and lithium antimony thiomalate are not standard items of medical supplies and are not available for distribution.

upper abdomen, bradycardia, dizziness, and collapse. Transient electrocardiographic changes are not uncommon. Pneumonic changes occasionally found post mortem are thought to arise from myocardial effects, perhaps associated with secondary infection.

Chemotherapy for schistosomiasis should be confined to fuadin and antimony and potassium tartrate, except when an approved investigative program is instituted. In the United States the approval of The Surgeon General should be obtained and in oversea areas that of the theater surgeon.

According to published reports, better results have been achieved with tartar emetic than with fuadin; however, the toxic effects of tartar emetic are reported to be much more serious and more frequent than those of fuadin. The commonly recommended total dosage of fuadin supplies only about 60 percent of the antimony in the usual total dosage of tartar emetic. Courses which are recommended for use by medical officers have been planned so that comparable amounts of antimony are given. If any toxic effect appears, the subsequent dose should be reduced or the administration of the drug temporarily or permanently discontinued, according to the circumstances. A course of treatment should not be repeated until after two weeks' rest.

Fuadin is recommended for first trial in treatment. The solid contains 13.6 percent antimony. It is supplied in ampules containing 6.4 percent solution, which is injected intramuscularly. The first three doses of 1.5 cc., 3.5 cc., and 5 cc. are given on successive days. Subsequent doses of 5 cc. are injected on alternate days, provided no toxic effect other than nausea appears, until a total of sixteen doses has been administered. If a course of fuadin is ineffectual, it is recommended that the patient receive tartar emetic.

Antimony and potassium tartrate (tartar emetic) contains about 36 percent antimony. The standard supply item comes in 1-oz. bottles. Solutions should be freshly prepared, using, if available, Medical Department supplies of sterile 5 percent glucose in physiologic saline solution, sodium chloride isotonic solution, or distilled water (preference in that order), rather than locally prepared diluent. If the diluent is prepared locally, it should be freshly distilled and sterilized. Every effort should be made to avoid the introduction of pyrogens during the preparation of solutions and to avoid the use of solutions containing pyrogens. Solutions of antimony and potassium tartrate should be perfectly clear and free of sediment. If a freshly opened, clean supply of drug is available, with aseptic precautions it may be removed from the container, weighed, and transferred to sterile diluent, using sterile spatula and weighing vessels. With a fresh, clean supply of drug, sterile diluent, and careful technique, such a solution may be administered intravenously without sterilization. If doubt exists regarding the suitability of available supplies or

technique, antimony and potassium tartrate solutions should be sterilized by gentle boiling for five minutes. They should not be autoclaved. This drug is best tolerated two or three hours after a light meal. It should be administered intravenously and should be given slowly. Since the solution is very irritating to the tissues and may cause sloughing, the needle should be wiped off with a sterile sponge and there should be no extravasation. The patient should remain recumbent for at least an hour after treatment. The first dose of the 0.5 percent solution is 8 cc. Provided no untoward reaction occurs, subsequent doses are given on alternate days and are increased on each occasion by 4 cc., until 28 cc. are being given. If no toxic reaction appears, a total of fifteen doses is given.

Since it is often necessary to give more than one course of treatment, the results of therapy must be carefully checked. When treatment is successful, eggs cease to appear in the stools. It may be concluded that treatment has failed to kill all the worms present, if viable eggs are found four weeks or more after a course of treatment is finished. Stools should be examined at least every week during and for a month after treatment. They should be further examined from time to time until a year has elapsed following therapy. If eggs with living embryos are found, further chemotherapy is necessary.

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# Factors Determining the Dosage of Penicillin in the Treatment of Infections

The purpose of this article is to bring together the important contributions which provide a basis for rational treatment of infections with penicillin. In contrast to the sulfonamides, the action of which is primarily bacteriostatic, penicillin in concentrations obtained in man causes sterilization of cultures of susceptible organisms within twenty-four hours and for this reason is often referred to as a bactericidal agent. Penicillin is characterized by a selectivity which refers to its high degree of antibacterial activity against gram-positive bacteria, as contrasted with its failure to prevent the growth of the majority of gram-negative bacteria. Susceptibility to penicillin varies among different species of bacteria and also among various strains of any one species. This is of special importance in certain staphylococcal infections and in patients with subacute bacterial endocarditis due to enterococci which are frequently resistant to penicillin.

Special consideration must be given to the behavior of the *Staphylococcus* when exposed to penicillin. Both in vitro and clinically, cultures of hemolytic streptococci and pneumococci are sterilized in twenty-four to thirty-six hours, whereas viable

Condensation of an article by Dr. Charles H. Rammelkamp and First Lieut. William M. M. Kirby, M. C., A.U.S.

staphylococci may be obtained after exposure to penicillin for as long as a week. Often these penicillin-resistant bacteria are found to contain an enzymelike substance which destroys penicillin. Penicillin resistance has been observed in about 10 percent of strains of *Staphylococcus* isolated from clinical sources. This resistance is less likely to be manifested if the organisms are, from the start, kept in contact with high concentrations of penicillin.

Studies of absorption of penicillin have demonstrated that when administered intramuscularly maximal concentrations in the blood are reached within fifteen to twenty minutes. Once absorbed, destruction by the tissues is slight, but the concentration in the blood falls very rapidly and 80 percent appears in the urine within two hours. Rapid absorption and rapid excretion make frequent parenteral injections of penicillin necessary. Various methods have been tried in attempts to decrease the rate of absorption and excretion. The intramuscular administration of 300,000 units of penicillin in 1 cc. of 5 percent beeswax and peanut oil has been found to be a promising method for slowing the rate of absorption.

The diffusion of penicillin into various body fluids and cavities occurs irregularly and to small extent. For this reason, local therapy, as well as parenteral injections, has been used in the treatment of infections of pleural, pericardial, and joint cavities, and in empyema. Only small amounts of penicillin diffuse into the spinal fluid. For this reason, both intrathecal and parenteral therapy must be used in the treatment of patients with meningitis. The use of sulfonamides in the treatment of patients with meningococcic meningitis is still considered the method of choice, since some strains of meningococci are relatively resistant to penicillin. Syphilitic meningitis is successfully treated by intramuscular injections of penicillin alone.

In the treatment of subacute bacterial endocarditis, the degree of penetration of the penicillin into the vegetations is important. To obtain favorable results with penicillin in this disease, the maintenance of high continuous blood levels is of paramount importance. This is also true in cases of chronic osteomyelitis.

Penicillin fails to appear in the saliva of normal subjects or in the sputum of patients with pneumonia, and parenteral injection does not change the normal throat flora. Parenteral penicillin, however, is highly effective in the treatment of patients with pharyngitis, tonsillitis, and pneumonia, but because of the persistence of the causative organisms in the throat and sputum, treatment must be continued until the danger of relapse is avoided.

Ideally and whenever possible, the objective of therapy with penicillin should be to maintain, at the site of infection, concentrations of penicillin which exert maximal antibacterial

activity against hemolytic streptococci and staphylococci by concentrations as low as 0.04 and 0.2 units per cubic centimeter, respectively. Lower concentrations produce definite but not maximal activity; higher concentrations do not produce any appreciable increase in antibacterial action. These values, 0.04 and 0.2 units per cubic centimeter, which apply respectively to a highly sensitive and relatively resistant organism, are of fundamental importance in relation to the concentrations obtained in the blood stream of patients.

Extremes in susceptibility to penicillin are represented by the *Staphylococcus* and the hemolytic streptococcus. In addition to the *Staphylococcus,* many strains of *Streptococcus viridans* and nonhemolytic streptococcus should be included in the resistant group. Because of the serious nature of infections such as syphilis, diphtheria, and gas gangrene, the organisms causing these diseases should also be regarded as highly resistant from a therapeutic standpoint until they have been further studied. Organisms other than the hemolytic streptococcus which are highly sensitive to penicillin are the gonococcus and pneumococcus. Strains of intermediate sensitivity are represented by the meningococcus. The relative susceptibility of various other organisms, including fungi, spirochetes, and rickettsiae, is not definitely known.

Other factors of importance in determining the size of the dose of penicillin are the severity of the infection, the vascularity of the area involved, and the barriers through which penicillin must diffuse or penetrate in order to come in contact with the infecting organisms.

It is possible to plan rational schemes of therapy for various infections taking all these factors into consideration, with special emphasis on relative sensitivity of each organism to penicillin. For staphylococcic infections, for example, intramuscular injections of 25,000 units every two hours will produce optimal continuous levels in the blood stream; for streptococcic infections, 15,000 units every three hours are adequate. Blood concentrations necessary for optimal, i.e., maximal, antibacterial effect can also be maintained when necessary more or less constantly with a continuous intravenous infusion. With 100,000 units per twenty-four hours, 0.1 unit per cubic centimeter can be maintained in the blood. This level will optimally control organisms sensitive to penicillin. With 200,000 units, a level of 0.2 unit per cubic centimeter can be maintained, and with 400,000 units, 0.4 unit per cubic centimeter.

Two points should be emphasized. The first is that larger doses than the optimal raise the concentration of penicillin without increasing the already maximal antibacterial activity. The other point is that penicillin remains active in the tissues for only three or four hours following the usual therapeutic doses. It is important, therefore, to give penicillin frequently

enough so that the blood level may be maintained at optimal levels constantly, especially in infections due to relatively resistant organisms.

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## The Management of the Dysenteries

When amebic and bacillary dysentery and other forms of acute diarrhea are common, responsible officers of the hospital staff should formulate a plan for the management of these cases as a group. If this is not done, there is insufficient concentration on essentials, available personnel and facilities are uneconomically used, and patients may receive inadequate treatment. Failure to realize the importance of the problem as a whole results in inadequate provisions for hygienic and sanitary needs of patients with dysentery. Lack of a plan of management is also reflected in repeated readmissions of the same patients.

If patients with dysentery are numerous, definite arrangements should be made for their concentration in one or more wards, under medical officers who should devote themselves to the special problems involved in the care of such patients. After the patient is admitted, valuable time should not be lost before isolation is instituted and diagnostic and therapeutic measures are started. For this purpose, a tentative decision must be made on the basis of the clinical impression derived from the history and physical examination, aided as soon as possible by stool examination. With good knowledge and some experience, it is possible in a large proportion of instances to decide very soon after admission whether a patient in all probability has amebic or bacillary dysentery, or bacterial or toxic enteritis. The preliminary sanitary and therapeutic steps should not be delayed until the etiological diagnosis in all its details is fully established.

The necessity that stools for study should be fresh cannot be overemphasized. In all cases, the ward officer should see for himself freshly passed stools (not specimens). The best diagnostic results are obtained when microscopic examinations and culture inoculations are done on the ward. For this purpose, a microscope with the necessary accessories and supplies of media must be kept in the ward. A room should be set aside for this work. Careful attention should be given to the efficiency of all the methods adopted. In bacillary dysentery, the value of the rectal swab method of obtaining specimens for culture (see paragraph 3*b* of TB MED 119) has been well established. Proctoscopy is a method of great value, both for inspection of lesions and for obtaining specimens. It should always be available and freely used. Here again, if the arrangements are convenient, if the ward officer is qualified and can do the examination on the ward, more and better studies will result. It should be the responsibility of the ward

officer himself to make sure that cultures and other specimens which have to go to the laboratory reach there with the utmost promptitude.

Although appropriate steps for the isolation and treatment of patients should be taken with the least possible delay and without awaiting the results of laboratory studies, an exact diagnosis should ultimately be determined in all instances of dysentery, in order to make possible appropriate therapeutic and preventive measures. Ward officers and laboratory officers must cooperate closely and constantly in order to get correct results promptly and in the maximum number of cases. A relatively large volume of laboratory work must be performed in the study of cases of dysentery. When the number of dysentery patients is large, the scope of the tests done by the laboratory for the whole hospital should be scrutinized closely to determine what studies are most helpful and what studies can be abandoned or reduced in number. Routine sets of examinations, the bane of medical practice, should be ruthlessly torn apart in order to do essential tests, such as those required by the dysenteries.

In the management of large numbers of patients with dysentery, it is essential to follow faithfully a few basic plans of therapy. The application of treatment to a given patient should be individualized when there is good reason to do so and the relations between staff and patients should be on an individual basis as far as possible. Nothing is gained, however, and much may be lost, by the constant introduction of minor variations in plans of chemotherapy. Beyond question, it is best to adhere to a small set of good plans and to eschew free "experimentation" with drugs which have in fact already found their level. The result of treatment for dysentery should be carefully checked before the patient is released. Failure to do so means running the risk of the establishment of chronic disease in the patient with wasteful readmissions and the dissemination of the disease.

Medical officers on duty in hospitals should always be "public health minded." This responsibility is as serious in the cases of the dysenteries as it is in any other instance. The isolation of patients and sanitary disposal of their excreta should be carefully planned and thoroughly performed. The proper management of large numbers of patients with dysentery requires the installation of more convenient and more numerous sanitary facilities than are ordinarily required. These patients must be adequately isolated until they are free of infection. If they have to use latrines, it is inexcusable to permit them to do so in common with other personnel or to compel them to go long distances. Convenient and plentiful provision for proper hand washing after going to stool is essential. Convalescent patients should not be permitted to go to a general mess until they have been shown to be free of infection.

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# Air Evacuation of Patients in New Guinea

The medical air evacuation transport squadron was distributed on 1 October 1943 as follows (see map, next page): at Townsville, 6 flight nurses, 12 enlisted men, and a captain; at Doboduru, 14 enlisted men and a captain; at Camp Holland, 19 flight nurses. The rest of the squadron was at Port Moresby. The units at Port Moresby evacuated patients to Townsville, from where one flight handled air evacuation to rear bases on the mainland. The personnel at Doboduru and Nadzab accomplished air evacuation to Port Moresby. After the medical air evacuation transport squadron (less the nurses) was assigned to the Fifth Air Force on 13 October, conferences were held with the surgeon of the Fifth Air Force, the surgeon of the troop carrier wing, and a representative of the chief surgeon of the U. S. Army Service of Supply. The general principles of air evacuation enunciated at these conferences were later embodied in Fifth Air Force Regulations. On 18 October the unit at Townsville moved to Doboduru, and a flight was sent to Nadzab to reinforce Captain Wiedeman. Our forces were now distributed to cover all important evacuation points in New Guinea, and during the month the squadron evacuated thousands of patients.

On 5 October Flight "B," with a captain and 15 enlisted men, was sent to Nadzab to run a clearing station as well as to care for patients during flight. By the time we arrived, the division had received its quota of Australian medical installations and had proceeded to Gusap. An eager group of men landed that morning. The Dust Bowl at home has nothing on the dust at Nadzab! We knew a portable surgical hospital was in the vicinity, and at last it was located in a beautiful coconut grove. Working with only two jeeps and trailers, it was well into the night before we finished moving in our equipment. The location was shaded and a small creek was nearby. The food was a spot was cleared and a grass hut built where patients could excellent and everyone treated us as his own. Contacts were made with the Australians who had been doing air evacuation since the fall of Nadzab and who now were established in a small patch of jungle. With the help of native labor and our own men, a spot was cleared and a grass hut built where patients could be kept in the shade while they waited for the planes to come in.

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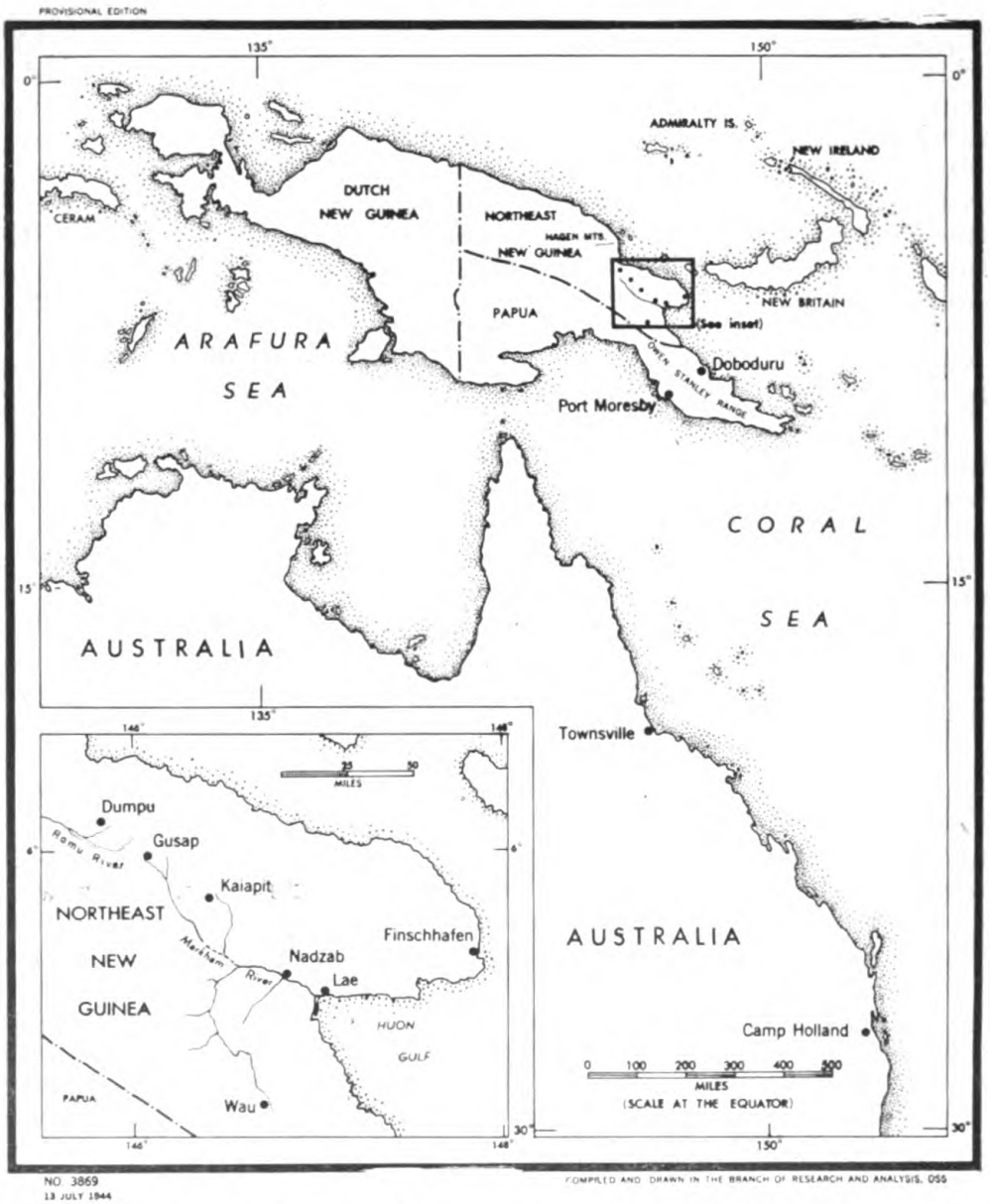
From a report for the last quarter of 1943 of a medical air evacuation transport squadron in which each flight commander analyzed the peculiar aspects of evacuation at his base; then the commanding officer, Major Walter S. Miller, Jr., M.C., consolidated the analyses. The flight commanders were Captains Hugh M. Crumay, M.C., Thornton I. Boileau, M.C., Geoffrey P. Wiedeman, M.C., and Leopold J. Snyder, M.C.; First Lieut. Clement J. Quarantiello, M.A.C., was adjutant, supply officer, and personnel officer.

Most of the patients for some time were Australians, as few American troops were in that area. This gave our technicians an opportunity to get experience in treating battle casualties and medical cases in flight. The routine was to send technicians up with cargo on C-47's and have them return with patients. They flew to Gusap, Dumpu, Kaiapit, and any other place where troop




carrier planes could go and would bring all patients into Nadzab, from where the Americans were sent to a portable hospital and the Australians to their medical dressing station. Transportation was terribly limited. We had only two jeeps equipped with litter racks to carry three stretcher cases apiece. And such roads! Once after a rain the bridge was washed away

over a small creek and we had to drive one jeep up to the creek, carry the litter cases across, and then load them on the other jeep.

It was essential that we be informed of the planes which were to carry patients to Doboduru or Moresby. Arrangements were made with a troop carrier wing enabling us to direct planes over to Lae to pick up wounded, and as communications improved we could evacuate Lae directly, sending the attendants up from Moresby, thus cutting out the extra hop from Nadzab. Every morning you could see our technicians getting on the planes bound for Dumpu, Gusap, and any other area where patients were known to be waiting. They made several trips daily, all in the combat zone. Accidents occurred but no attendants were injured.

The third platoon from a field hospital came up from Lae and established itself temporarily in the same coconut grove with the portable hospital. The platoon took care of most of the medical cases while the portable hospital cared for the surgical cases. Toward the end of October, Flight "B" was attached to a TCS and once again we hacked tent space out of the jungle. This move gave us foreknowledge of plane movements up the Markham Valley, improved communications, and enabled us to share the vegetables and fruits brought in by ships returning from Wau and Mount Hagen.

On the way from Townsville to Doboduru on 17 October we climbed above the overcast, although clouds still hung about the mountains on either side. Captain Boileau writes that going through the pass, we felt the suppressed excitement of a goal within reach, for at last the Owen Stanleys were crossed. We eased into a landing amid the dust clouds, a tired but happy outfit. Packed into trucks, we drove through a haze of dust for miles to our areas. The nurses were established in barracks at a station hospital. The men joined those of Captain Snyder in the coconut grove of the portable hospital. After a sleep and generous amounts of soap and water, we took in the surroundings. The morale of the personnel was high.

The serious business of learning the problems of air evacuation in that area and of becoming familiar with the system in operation under command of Captain Snyder was undertaken. The nurses began part-time duty at the station and the evacuation hospitals, where they became acquainted with the types of cases which would be transported by air. The men were working with those of Flight "G" in unloading incoming planes from Nadzab, and speeding the loading of patients on Moresby-bound planes each morning.

Our strip-side installation and dispensary were located on a strip which had been designated for transports and were functioning well. Captain Snyder had made arrangements for the construction of a shelter on the main taxiway against a heavy

growth of timber, where all the planes moving into the dispersal area could be checked for incoming patients. The area was cleared with the help of natives, palm-thatched latrines were installed, and construction work was begun. After acquainting us with operations and plans, Captain Snyder moved to Nadzab on 2 November. The men of Flight "C" followed over a ten-day period. In two weeks, a shelter 81 feet long, with concrete floor and thatched roof, was completed, the building being divided into a supply room and a room for the dispensary and litter patients. After fighting mud and rain for days, a solid, semi-circular drive with ambulance parking area was finished, making it possible to discharge patients in front of the shelter and maintain a flow of traffic.

With a load of from 75 to 150 cases a day, it was found confusing to bring walking cases into the dispensary. To correct this, a ward tent was erected next to the shelter, with litter boxes for benches. The walking patients were then brought into the tent, while the shelter was reserved for litter cases and first aid. In another tent, quarters were set up for five men who were to be quartered at the strip. The shelter and two ward tents would accommodate 100 patients, if necessary, by using cots. The calm was shattered one day by the boys rushing in yelling they had killed a snake, a 14-foot python, as big around as my leg. The killing and skinning of the snake furnished material for writing home for days.

To coordinate operations, the gathering of information on evacuees was speeded up so we could signal Moresby for planes the next day. By contacting the American hospitals and the Australian general hospital it was agreed to have evacuation lists available by late afternoon; so the signal was on its way at five o'clock instead of nine o'clock. This had the advantage of giving us plane numbers early so we could plan loads for the following morning. A cause of confusion when loading a number of planes was that patients arriving in ambulances were not in the same sequence as on the manifest. Through the cooperation of Captain MacDonald of the Australians, the ambulances were loaded according to sequence on the manifest, thus enabling the nurses to review the patients they were to attend before loading and making easier the loading of a number simultaneously. As inadequate restraint and sedation of psychotics had caused some difficulty, Sergeant Lander was brought from Moresby to demonstrate the method used in Townsville.

By this time things were running smoothly and from three to six plane loads were sent daily into Moresby. Our men, with the aid of the Australians, kept careful check on all incoming planes so there was no delay in unloading patients. Australian ambulances were used except in emergencies, and their work was excellent. A review of these patients impressed on us the need for refreshing drinks and nursing care at the strip side.

In November no new areas requiring air evacuation were

opened and no important changes were made in the personnel of the various flights. The chief problem was the construction of strip-side shelters at Port Moresby, Doboduru, and Nadzab.

December was a month of great activity. On 7 December the officers and men of Headquarters Flight and Flight "A" moved from the station hospital to the Troop Carrier Wing. A big shock came on 16 December with the information that all troop carrier planes at Doboduru would henceforth be based at Moresby. At the same time Captain Snyder, after a reconnaissance at Finschhafen, recommended that a flight surgeon and three surgical technicians, a clerk, three other men, and a jeep be sent by air to Finschhafen on 21 December. Lieut. Quarantiello went to Doboduru immediately and moved all our personnel and equipment over to Port Moresby. There were 12 nurses, 4 enlisted men, and enough equipment and baggage to require three C-47's to move the flight. A radiogram was received, stating that our flight nurses had at last been assigned to the Air Forces and to our squadron; after six months we were finally all together again as a unit.

## FINSCHHAFEN

Evacuations by air began from Finschhafen on 16 December. Flight Lieut. Kiel of the RAAF attached to the squadron was sent ahead to lay the ground-work, and he immediately organized, planned, and began the evacuation of casualties. As he had no personnel to help, adequate records and proper check on supplies were impossible. On 21 December, a flight of seven men arrived to take charge of air evacuation. Equipment had been brought to set up a dispensary and shelter, but it was found that both the Australians and Americans had evacuation stations near the air strip, complete with dispensary. Since these would serve for the present, we did not then request additional construction.

Sufficient Moresby ships were not always available; so we had to evacuate patients where and when we could find planes. Hence it was necessary to keep a technician on hand for emergency cases. This was doubly true because the Australians had no facilities for holding patients except overnight. We were able to help by giving up a regular schedule of evacuation so as to get patients out as soon as possible. All cases arrived at this base by water and sometimes were on a plane one-half hour after debarking. The American hospitalization setup held all patients overnight and they were evacuated on regular schedule each morning. Because of adequate hospitalization, there were fewer American "station hospital type" cases evacuated and consequently a much higher ratio of "battle casualties" and litter cases. The Australian troops had been exposed to front-line, jungle action for months, and high rates of "medical" evacuations were to be expected. As only the approximate number of evacuations could be determined beforehand, considerable need for "juggling" and replanning loads developed. The patients were checked each morning, plane loads made up, and

patients loaded as planes arrived. They were then hauled to the air strip, parked in proper order, and loaded on planes as soon as the cargo had been unloaded.

The problems here were different from those elsewhere, but the principles of evacuation which we had formulated still applied. On 2 December Captain Wiedeman, who had introduced air evacuation into Nadzab, was reassigned to take command of our air evacuation unit in Moresby. Captain Snyder, who had worked with Captain Wiedeman since early in November, assumed command the same day. Still feeling that air evacuation activities necessitated two officers in the Nadzab area, Captain Boileau joined Captain Snyder on 3 December, leaving Doboduru where he had been in command of another flight.

The hazards of daily flying were brought sharply to our attention. Captains Snyder and Boileau, flying together in a transport, had the experience of hearing a tire blow out in mid-air. Thanks to the pilot's skill in landing the plane, the personnel were scarcely shaken. However, on that day two surgical technicians were in a plane that crashed. Although injured slightly, they helped extricate the pilot and gave emergency treatment till he was flown to Nadzab and brought to a hospital. These hazards are accepted as part of the job. Fortunately, we have lost no one through accident and pray this happy state will continue. In December almost all of us had some sort of dermatitis, usually on the arms and attended by pruritus. As a whole, the health of the men remained excellent, aided by the amazingly good food we were able to obtain. For the greater part of the month the campaign was static and the insects were much more dangerous than the Japanese. Our personnel still flew forward with cargo-laden ships to Dumpu and brought patients back to Nadzab. A similar system was started for the evacuation of Gusap. Two technicians would fly to Gusap and bring patients back either to Nadzab or Port Moresby. If necessary, they remained overnight in Gusap to take the early morning flight to remove patients to more rearward areas.

Late in December it was decided that our installation must keep pace with the development of the base. Plans were in progress for a more pretentious installation in an area farther from the dirt and grime of the air strip. The commanding officer of an air task force took a very personal and kindly interest in our problems and spent much time expediting our plans. About this time the flight nurses were reassigned to the Air Forces. We started proceedings to have a group of them come to Nadzab to help handle evacuation of the Ramu Valley. Again a colonel came to our aid, providing splendid quarters for them in the air task force area. Finally, on 31 December, they landed on the "old Nadzab" strip, happy and excited, prepared to do the work for which they had waited so long.

This brought an end to the year for Nadzab.

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No. 2

# Original Articles

## Use of Small Airplanes for Medical Evacuation on Luzon

COLONEL M. J. MUSSER, JR.
Medical Corps, Army of the United States
and
FIRST LIEUT. EMMETT C. TOWNSEND
Medical Administrative Corps, Army of the United States

Overland methods of evacuation operate with maximum efficiency under conditions of stable warfare, open terrain, and a satisfactory road net. When war is fought from island to island, in jungles, and with armored and mechanized equipment, overland evacuation occasionally is impossible and frequently dangerous and unsatisfactory. Increasing efforts have been made to develop air evacuation. At present, systems of large transport evacuation operate daily in every theater. Flying boats and small liaison planes have been used for emergency purposes.

The large-scale use of small cub-like planes as the sole means of removing the sick and wounded from forward areas became necessary in conjunction with airborne operations behind enemy lines during 1943 and 1944 in the China-Burma-India Theater. Operating from rapidly built, isolated transport and fighter bases, they flew many sorties to small improvised strips cleared from the jungle, not only to evacuate casualties, which otherwise would be impossible, but also to provide food, ammunition, and medical supplies. The success of this effort suggested the extensive use of small planes in a well-organized system of evacuation, and steps were taken to improve the facilities of the planes. Model B of the Stinson L-5, which has been thus used on Luzon, will carry one sitting or one litter patient in comfort. Shortly before the Luzon Campaign, the Air Forces offered the services of the L-5 squadrons of an air commando group to the surgeon, Sixth Army, to be used for evacuation and supply purposes as a part of the Army medical service. The offer was accepted.

### ORGANIZATION

Army medical evacuation for the Luzon Campaign was provided by a medical group headquarters to which medical battalions and separate ambulance, clearing, and collecting companies were attached. One battalion with sufficient units to provide all necessary services was placed in support of each army corps. The group headquarters in close association with

the army surgeon directed the operations of the several battalions and coordinated their activities with the over-all tactical situation.

In developing the system of air evacuation, full advantage was taken of the established organization and the liaison, communications, and operational facilities which it provided. It was felt that the use of small plane and ambulance evacuation should be interchangeable and complementary, and since the existing ground organization had successfully provided all necessary ambulance evacuation, the air evacuation system was adapted to it. All ground organization and operations were provided and controlled by the Army Medical Department. The air commando group operated and maintained the planes and furnished the radio communications. Medical battalions were responsible for the evacuation, supervision of landing strip construction and operation, and the determination of needs for planes at clearing and collecting companies and hospitals within their respective corps areas. The medical group headquarters, working directly with the air commando group, functioned as the central coordinating and regulating agency between the Ground and Air Forces. Landing strips were established at or near all hospitals and clearing stations and at division collecting stations when possible. Planes were dispatched according to a daily schedule of missions to operate throughout the network for the accomplishment of both routine and emergency evacuation. The normal ambulance service remained available for use whenever the planes or certain strips were nonoperational.

The landing strips were constructed by the Engineer Corps on the recommendation of army, corps, and division surgeons and, before use, were checked and approved by the air commando group. The strips were about 1,000 feet long by 75 feet wide, were not surfaced and, when possible, were oiled to minimize dust. A road grader or bulldozer was usually sufficient to render a flat, clear expanse of terrain operational in a few hours. Distinguishing markers were used to identify the strip to the pilot and also to indicate his security in forward areas in danger of enemy infiltration.

When the strips were located at hospital or clearing stations, taxiways to the receiving and evacuation wards were constructed, thus eliminating the use of ambulances as intermediary carriers. In many instances it was necessary to locate the strips one or two miles from a medical installation. Frequently, forward artillery observation strips were found to be sufficiently near the clearing and collecting companies to be used for evacuation purposes. These usually required some lengthening, which was readily accomplished with the cooperation of the artillery, who agreed to routinely construct their strips large enough to accommodate L-5's. As the tactical situation permitted, clearing and collecting company com-

manders found it expedient to establish their stations in the vicinity of these strips, thereby eliminating the need for additional construction. When the strips, except those servicing division collecting companies, were located some distance from the medical installations, small 25-bed holding stations were established and equipped for emergency medical treatment. A medical or medical administrative officer, technicians, litter bearers, equipment, and ambulances to operate these stations were provided from army collecting companies. Incoming and outgoing evacuees were cared for and held in these stations until transported by plane or ambulance. Division collecting companies were responsible for the operation of the strips servicing their stations.

A major problem was the establishment of a system of liaison capable of determining the evacuation needs of all clearing and collecting companies and hospitals, the bed status of hospitals and other pertinent information, and a communications system which would assure the rapid transmission of messages between all units concerned. Routine daily reports of admissions, dispositions, patients awaiting evacuation, bed status, and needs for supplies were prepared by specially trained enlisted personnel attached for such liaison purposes to all hospitals and clearing stations. These reports were forwarded by the most readily available means (vehicles, evacuating planes, and telephone) to medical battalion and group headquarters and served as the basis for the day-to-day operation of all phases of evacuation. Field telephone facilities were used extensively to keep headquarters informed of new developments, progress of evacuation, status of new strips, needs for additional planes, and emergency requests for supplies. Two-way radio communications were established between the air commando group, medical group headquarters, battalion headquarters, and major strips located throughout the island. This network was used with excellent results for coordination of all operations between the Army Air and Ground Forces. Further extension of the network to include every station would provide the ideal means of liaison and communications. All personnel were thoroughly familiarized with the organization of the system and carefully trained in the performance of their duties. Standing operating procedures were published in order to obtain maximum uniformity and efficiency of operation.

## OPERATION

The small planes were used primarily for the evacuation of sick and wounded from the division clearing and collecting companies to field and evacuation hospitals and for the evacuation of emergency casualties in any area. Under such circumstances, the rapid movement of fresh battle casualties is essential, and the largest number of obstacles and hazards to ambulance evacuation exists. Isolated and inaccessible col-

lecting stations, portable surgical hospitals, and clearing stations located on bad roads or at some distance from army hospitals were especially benefited by L-5 evacuation. These could be serviced almost immediately after the completion of the strip, so that with proper planning and coordination, air evacuation could be available to them within twenty-four hours of their establishment.

Emergency evacuation not only served its obvious purpose, but also made the services of unusually well-qualified specialists more widely available. To an increasing extent, casualties requiring immediate neurosurgery, maxillofacial surgery, and other highly specialized procedures were flown to hospitals where these services were available. Because of the reduction in time required for evacuation, hospitals could be kept in operation in a given location for a longer period and, by careful routing of casualties, congestion of hospitals in certain areas could be prevented.

The small planes operated with maximum efficiency over distances of not more than thirty miles. One plane was able to evacuate six to ten patients during a day. Routine flights in excess of this distance were found impracticable especially when a large number of patients were to be moved, for the prolongation of round-trip flying time allowed for the evacuation of too few patients by a single plane.

Small planes were also used to evacuate patients from forward hospitals to medical installations in the rear for further treatment or to evacuation stations for off-the-island evacuation. This was especially desirable when poor roads, distances, and other factors rendered ambulance evacuation lengthy, tiresome, and uncomfortable. For the movement of large groups of patients over these longer distances and when suitable strips were available, the use of transport planes was much more satisfactory.

The emergency delivery of medical supplies to forward units was readily incorporated into the evacuation system. Medical battalion and group supply sections were used advantageously to procure and deliver supplies to the planes. On several occasions, personnel and equipment of detachments or small medical units were flown into isolated and otherwise inaccessible areas where they were urgently needed. These services were accomplished without interruption of evacuation.

The disadvantages of small plane evacuation were the operational interferences resulting from bad weather, the limited capacity of the planes, the necessity of providing an extensive network of small operational strips, and the rather large number of ground personnel required to operate the strips. Furthermore, in combat areas the planes were available only during daylight hours.

The schedule of air evacuation for a given day was prepared as follows: By 2000 hours of the preceding day each

battalion would submit by radio or telephone a report to medical group headquarters which include: (1) The estimated number of planes needed at clearing and collecting companies based on known casualties to be evacuated and anticipated admissions. (Collecting company evacuation was usually considered an emergency, and an arbitrary number of planes was designated daily for them.) (2) The number of patients to be evacuated from each hospital in their area, classified as to whether sitter or litter, for further local hospitalization, or for off-the-island evacuation. (3) The time planes were desired. (4) The bed status of hospitals in the area. (5) Emergency or unusual needs, including supply. (6) Local problems pertaining to evacuation. These reports from the several battalions were consolidated by medical group headquarters and from them a schedule of evacuation was prepared for the entire army area, which included the number of planes to be dispatched (also types when transports were used), their initial destinations, time of arrival, routing, and other details. This was passed to the air commando group for confirmation, and when obtained, battalions were informed in detail so that planes and coordination could be completed with all stations and units concerned. The planes were dispatched by the commando group on the following morning according to schedule and operated until all evacuation had been completed. Throughout the day the progress of evacuation was carefully followed to assure adherence to the schedule and proper ground coordination.

Requests for emergency evacuation and supplies and for additional planes at any station were made by radio or telephone to battalion or medical group headquarters at any time or relayed by pilots. Sufficient planes were held in reserve to accommodate these requirements and were dispatched immediately on call. At the hospitals and clearing stations, and whenever possible at the collecting stations, casualties were prepared for evacuation well in advance of the arrival of the planes so there would be no delay in loading. When the strip was some distance from the station, a number of casualties sufficient to fill all incoming planes were transported by ambulance to the strip. These were placed in the holding station to await the arrival of the planes or loaded directly into the planes from the ambulances. The officer at the strip was required to check the condition of each patient, to supervise the loading and unloading, and to inform the chief pilot of changes in the number of evacuees and needs for additional planes. While the planes were evacuating the first group of patients, another group was transferred from the station, thus assuring a steady flow of casualties to the strip and minimizing the length of time casualties were required to remain in the holding station. This procedure was continued until all casualties had been evacuated. The receiving and transportation of

incoming casualties at hospital strips were incorporated into the system, the continuous ambulance shuttle providing for their delivery to the hospital with a minimum of delay.

In a period of one month, twenty to thirty planes were operated daily over a network of forty strips to evacuate more than three thousand casualties efficiently, rapidly, and in comfort, without a single serious operational accident. The ground organization was such as to handle any number of casualties with ease, and the system of operation could have accommodated seventy-five or more planes as readily as twenty or thirty.

Cooperation between the air commando group and the Army Medical Department was of the highest order and was the major factor in the success of the organization and operation of the evacuation system.

## CONCLUSIONS

The use of small planes for evacuation can be readily incorporated into the organization for the medical evacuation of a field army. By proper ground organization and supervision and close coordination with the Air Forces, small plane evacuation can be operated simply, smoothly, and efficiently. Its inclusion as an integral part of Army medical evacuation is justified by present experiences.

The use of small planes and ambulances as complementary means of medical evacuation provided the sick and wounded with less hazardous and far more rapid and comfortable transportation than has hitherto been possible. Small plane evacuation permits the rapid removal of casualties from the forward combat areas to field and evacuation hospitals, and completely surmounts such obstacles as difficult terrain, poor roads, and tactical hazards.

Small plane evacuation permits Army hospitals to operate in a given area for a longer period of time, the rapid movement of emergency casualties to installations where special facilities are available, and the easy rerouting of casualties to prevent congestion of certain hospitals. The use of planes for emergency supply and for the movement of small medical units to inaccessible areas can be accomplished without interference with evacuation. The disadvantages of small plane evacuation are few and did not interfere with evacuation during the Luzon Campaign.

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**The Ernestine Koranda,** which on her maiden voyage as a hospital ship arrived at Charleston, S. C., on 10 May with 707 wounded men from the European Theater of Operations, was the first hospital ship to touch American shores after VE-day. This ship was converted from an intercoastal freighter into a 750-bed hospital ship and was named in honor of Army Nurse Lieut. Ernestine Koranda, who was killed in the Southwest Pacific in December 1943.

Vol. IV
No. 2

# Symptomatology of Early Schistosomiasis Japonica

COLONEL HENRY M. THOMAS, JR.
Medical Corps, Army of the United States
and
CAPTAIN DAVID PUTNAM GAGE
Medical Corps, Army of the United States

The invasion of Leyte Island began on 20 October 1944. In the next few days, troops moved into areas consisting largely of inundated rice paddies. Although we were well aware of the presence of schistosomiasis on Leyte Island, its distribution was not known. A survey was immediately begun by personnel of malaria survey units under the direction of a parasitologist. Areas were mapped out that harbor the snail *Schistosomophora hydrobiopsis* which serves as an intermediate host for the *Schistosoma japonicum.* The results of the survey correspond very closely with that made in 1940-41 by the Philippine Bureau of Public Health which only became known to medical officers on the spot after the Japanese forces were driven out of Tacloban, capital of Leyte. Both surveys show that the eastern coast of Leyte from Palo south and the eastern half of Leyte Valley contain many heavily infested areas. By tracing the progress of the troops in the early days of the operation, we can fairly well limit the time of initial exposure to 1 November 1944 or later. One group of five patients from a portable surgical hospital recalls that their only exposure occurred while swimming on one occasion in a fresh water river for less than half an hour, between 5 and 10 November. Two of these patients were the first Army personnel in whose stools ova were found (cases 1 and 2 reported below). A second group, from a bridge-building engineer battalion, started work in the same stream and nearby streams on 1 November 1944, and a third group took up work in the same river on 10 November 1944. Cases from these latter groups were admitted to hospital about the same time as those from the first group. Investigation of all proved cases to date has revealed exposure of the skin to fresh water which is known in some cases and highly suspected in others to be infested with cercariae. Soldiers in the same units who were not so exposed have not shown evidence of infection. Patients with urticaria and eosinophilia were seen in hospitals early in December, but schistosome ova were not demonstrated in the stool of any pa-

tient until 30 December 1944. During the next week, 14 cases yielded positive stools and in the following week 22 cases were so diagnosed.

## SYMPTOMS

The symptomatology of early schistosomiasis is not well known. Since a knowledge of clinical manifestations in early cases is extremely helpful in the prompt diagnosis of the disease, the findings in patients recently infected merit description. The following account is based on the observation of 41 cases, all studied within three months of their first infection.

In 4 of these cases a history of burning and itching immediately after exposure was obtained. In 5 cases, symptoms which appeared in the third or fourth week have been discounted, because we were seeing at the same time other patients with similar symptoms who had had no exposure to schistosomiasis. The symptoms in these cases were fever, headache, abdominal cramps, and diarrhea, with urticaria in only one instance. On the other hand, there were 6 cases in which symptoms first appearing at the end of the third or in the fourth week are clearly attributable to schistosomiasis. The course in 2 of these cases began on the twenty-first day and was continuous up to the time that eggs were found in the stools. The week in which symptoms accepted as belonging to the disease appeared was as follows: third week (end), 2 cases; fourth week, 4 cases; fifth week, 7 cases; sixth week, 8 cases; seventh week, 13 cases; eighth week, 7 cases; ninth week, 1 case; undated, 1 case.

On admission to hospital, the chief complaints were chills, fever, sweats, headache, backache, nonproductive cough, abdominal discomfort, and profound anorexia. Urticaria accompanied these symptoms in one-quarter of the cases and diarrhea in one-fifth. Symptoms in order of frequency in 41 cases were: headache 35, anorexia 30, cough 30, chills 23, abdominal cramps 16, backache 12, diarrhea 8, itching 7. Fever was present to some degree in all cases. In two cases symptoms of central nervous system origin were present. Other symptoms sometimes seen are stiffness of neck muscles, chest pain, abdominal cramps, and loss of weight. Symptoms and signs of acute appendicitis have been reported in other series.

Urticaria was present at one time or another during hospital stay in 10 cases. It was usually inconspicuous in our cases, but giant urticarial reactions were seen in other cases. The pulse rate was elevated in proportion to the temperature. In a few cases, the respiratory rate was elevated and respiratory movements were shallow. The lungs were usually clear, but in three cases, rales were heard. X-ray pictures of the lungs were made in 13 cases, of which 11 were normal. In two instances, scattered small areas of infiltration were present, one of which closely resembled the picture of miliary tuberculosis.

The most constant finding on physical examination was enlargement of the liver (30 cases), with tenderness on palpation or heavy percussion. The spleen was felt in 9 cases.

The temperature was usually low in the morning and higher in the afternoon, reaching from 99° to 105°. A more or less regular spiking temperature curve was seen in a number of cases, but the temperature curve is often irregular. Four cases, observed for two to four weeks before treatment was begun, showed a spontaneous remission with the temperature gradually returning to normal or nearly normal. Because of the early institution of treatment in the great majority of cases, the frequency of such spontaneous remissions is unknown.

The total white blood cell and differential counts were characteristic. There was leukocytosis which rose from day to day, reaching a count as high as 50,000. Eosinophilia was present, at first to the extent of 15 to 20 percent, later rising rapidly, reaching 50, 70, and in a few cases, 90 percent. The total number of eosinophils was often as high as 20,000. In one case 86 percent of 54,400 white blood cells or 44,700 eosinophils were recorded. The urine was not remarkable. Bile was present only in the single case in which jaundice was present.

Stools were normal or soft, sometimes containing mucus and small amounts of blood. Schistosome ova were first found from 6½ to 10 weeks after the first possible exposure (average about 7½ weeks). Occasionally ova were more easily demonstrated in specimens after a saline purge had cleared the lower bowel. A simple technique of emulsifying the stool in distilled water, filtering it through gauze, allowing it to settle for one-half hour, pouring off the supernatant fluid, and examining the sediment microscopically yielded excellent results. The stool frequently contained hookworm ova and occasionally amebic cysts.

Patients varied from being practically asymptomatic to being extremely ill. Those with high fever sweat profusely, especially at night. They found it difficult to take nourishment and complained of severe headache, abdominal distention and cramps, and marked tenderness over the liver. Cough was troublesome, and often worse at night. The following case reports illustrate the course as observed by us.

## CASE REPORTS

CASE 1. A 33-year-old white medical officer was admitted to hospital on 28 December 1944 with a definite history of a single exposure while swimming in an infected stream between 5 and 10 November. He began to have chills, fever, and loss of appetite and strength on 26 November. For about ten days, the evening temperature was as high as 103° to 104°, but the morning temperature was about normal. The patient was considered to have had dengue. Although he improved after this, he continued to have evening fever and malaise and began to note muscle soreness and stiffness and epigastric tenderness. He also observed scattered

small urticarial lesions which he attributed to insect bites. Examination was only remarkable for enlargement of the liver and spleen. Light percussion over the liver was extremely painful, although palpation caused only moderate discomfort. On admission the white blood cell count was 14,400, with 22 percent eosinophils. Four days later, the total count was the same, but the eosinophils had risen to 32 percent. X-ray of the lungs was negative. Stool examinations, beginning on 30 December 1944, repeatedly demonstrated ova of *Schistosoma japonicum*. Treatment with fuadin was started on 1 January 1945.

CASE 2. A 25-year-old white medical officer belonging to the same unit as the patient in case 1 was admitted on the same day. He had the same exposure and much the same symptomatic history as the first patient. A month before admission (some twenty days after exposure) he began to have fever, anorexia, malaise, and diarrhea. He received sulfaguanidine, and diarrhea ceased at the end of the week, but afternoon fever and marked anorexia persisted. Three weeks before admission, the patient noted urticarial wheals on the buttocks, groin, and lower abdomen. One week before admission he developed a persistent dry cough. On admission a number of urticarial lesions were still present. The liver was palpable and tender. The spleen was also felt. X-ray picture of the lungs showed scaftered areas of infiltration. The white blood cell count was 12,300, with 13 percent eosinophils. Stool examination repeatedly showed ova of *S. japonicum*. Treatment with fuadin was started 1 January 1945. On 18 January, the white blood cell count was 18,100 and the eosinophil percentage, 38.

The central nervous system was apparently involved in two cases in this series, and one not in the series. All three patients had weakness of arms and spasticity of the legs with increased reflexes of arms and legs, and two of the three had bilateral ankle clonus. Sensation was normal. All three also had moderate elevation of temperature, increasing leukocytosis, and rising eosinophilia. The stools in two cases contained schistosome ova. One patient was disoriented on admission. The date of his exposure was unknown. Symptoms first appeared on 17 December 1944 and schistosome eggs were found in the stool on 17 January 1945. He presented lesions of the skin of the small toes and great toes of both feet typical in appearance of occlusion of the end-arteries. On the small toes the lesion consisted of black gangrenous areas 1 cm. in diameter on the outer aspect of the end of the toe. These were exquisitely tender at first. On the great toes similar, slightly larger, deep red areas were present. These were less tender. In the presence of normal pulsation of dorsalis pedis and posterior tibial arteries these lesions were thought to be caused by occlusion of the end-arteries by emboli of schistosome ova with or without thrombus formation. The patient improved greatly following treatment with fuadin.

The patient not included in this series was admitted in coma. Despite negative stool examinations, increasing eosinophilia in the blood led to treatment with tartar emetic under which the patient improved slightly, but soon relapsed and died. Necropsy was performed which will be reported in detail by Captain Jack V. Dillahunt. In brief, the gross findings were

enlarged liver (2,800 gm.) with round, oval, and square yellow pseudo-tubercles, 1 to 3 mm. in diameter. When crushed, these granulomata were found to contain six or more schistosome ova. Similar lesions ("sandy patches") were seen throughout the large and small intestines. The brain and cord appeared grossly normal. Careful search for adult worms was fruitless, and no ova were found in the bowel contents.

The only fatal case in the series reported here was complicated by amebic dysentery. The probable date of exposure to schistosomiasis was 1 November. Symptoms first appeared on 26 December 1944, and schistosome eggs were found in the stool on 8 January 1945. X-ray of the lungs showed widespread small areas of infiltration similar in appearance to that of miliary tuberculosis. The temperature reached 104° to 105° daily. There was no apparent response to graduated doses of intravenous antimony and potassium tartrate. The ninth dose (2½ gr. in 1,000 cc. of 5 percent glucose solution) was more than half completed when the patient felt nervous and short of breath. The injection was stopped immediately. The patient improved and felt comfortable. The blood pressure was measured and found to be 130/80 mm. Hg. Ten minutes later, the patient died suddenly. At autopsy the gross changes in the liver were similar to those in the fatal case mentioned above. In addition, there were pseudo-tubercles throughout both lungs. The immediate cause of death was not apparent. Microscopic examination had not been completed when this was written.

Chemotherapy in this group of patients consisted of antimony and potassium tartrate in some instances and fuadin in others. Dosages and methods of administration were those usually recommended. No untoward reactions to fuadin were noticed. The commonest side-effect of tartar emetic was nausea, which was regarded only as an indication not to increase the next dose nor to reduce it until tolerance is improved. It is possible, but not certain, that the fatal outcome in the case mentioned in the preceding paragraph was precipitated by tartar emetic. It is too early to evaluate the results of treatment in this group of patients, but symptoms were promptly relieved in most cases and eggs disappeared from the stools at least temporarily in many instances.

## DISCUSSION

It is of interest that four patients had symptoms immediately following exposure, which were presumably associated with penetration of the skin by cercariae. A few of our patients had symptoms that occurred while the worms were maturing and before eggs could be deposited, according to the usual accounts of the development of *Schistosoma japonicum*. Such early symptoms appear to be associated with sensitizing or toxic products of maturing worms. We are unable, however, to separate clearly these early symptoms from those

which occur later and are associated with the deposition of eggs. The development at a relatively early time of manifestation of irritation of the central nervous system in three patients, one of whom died, is noteworthy. It appears, therefore, that this is one of the directions in which early schistosomiasis constitutes a threat to life.

Under the circumstances, it was inevitable that attention was first attracted by patients who manifested relatively clear-cut symptoms and signs. Further experience has indicated that many individuals whose stools prove them to have schistosomiasis have only trivial clinical abnormalities or even none at all at the time of diagnosis. It should be remembered, however, that the absence or mildness of symptoms may not correspond to the severity of infection and that severe disease might develop at a later date.

There is every reason to emphasize the importance of early diagnosis and prompt treatment. In this group of cases, the diagnosis of schistosomiasis was made only during the second stage when eggs were being extruded. Although the diagnosis can be substantiated only by demonstration of the eggs or the worms, it should be suspected at the earliest possible moment on epidemiological and clinical grounds. Treatment is the more effective the earlier it is given, since the sooner it is given, the smaller the accumulation of eggs to which the ultimate disastrous effects of the disease must be attributed. Autopsy material in two fatal cases showed numerous collections of eggs already deposited and pseudo-tubercles already found in the intestinal wall and liver, and in one of the two cases also in the lungs. Much weight should be given to a clear history of exposure. If exposure is followed in three or four weeks or less by itching, urticaria, fever, dry cough, and increasing eosinophilia, in the absence of other satisfactory explanation, schistosomiasis may be regarded as probably present. Under these circumstances, even though the diagnosis has not been proved, it may be wise to initiate treatment, using fuadin because of its lower toxicity. Every effort should be made, however, to prove the diagnosis.

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**Sumatra**, with about 180,000 square miles astride the equator and a population (the last census was in 1930) of about 8,000,000, is one of the most malarious areas of the world. The factors involved in the incidence of malaria there are extremely complicated in some regions. Control measures that would reduce malaria elsewhere actually would increase the frequency of this disease locally. Both of the vectors of dengue, *Aedes aegypti* and *A. albopictus*, are found in Sumatra, the former being the more active carrier. The last severe pandemic of dengue in 1901 incapacitated a large part of the population. Since then dengue has remained endemic. Filariasis due to either *Wuchereria bancrofti* or *W. malayi* is widespread. Venereal diseases abound. Yellow fever is unknown, although the occurrence of *Aedes aegypti* is widespread. Probably at least 60,000 lepers are present in the Netherlands East Indies. Tetanus is common. Diphtheria occurs throughout Sumatra.

Vol. IV
No. 2

# Cross Connections at Army Installations

MAJOR H. H. GERSTEIN
Sanitary Corps, Army of the United States

Some buildings converted for Army use have presented problems in cross-connection hazards. These hazards were accentuated by an Army population several times greater than was contemplated in the original design, thus causing intensive use of toilets, lavatories, baths, and showers during short periods of time. Under these abnormal conditions, inadequacies in piping due to corrosion or too small size showed up serious hazards due to plumbing defects which would not have been recognized under normal civilian loads.

At one hotel installation, demands on the water system caused vacuums in the hot and cold water supply piping as great as 10 inches of mercury (figure 1). It was recommended that the undersized piping be reinforced with additional supply lines to prevent vacuum in the system. At another hotel installation, the flushometer valves were of a type which could easily permit back-siphonage of the toilet contents. Here a real health hazard existed because of frequent vacuums in heavily loaded hot and cold water piping. As a temporary measure to minimize the hazard of back-siphonage, the periods of use by the troops of the plumbing fixtures were staggered to prevent negative pressures in the piping.

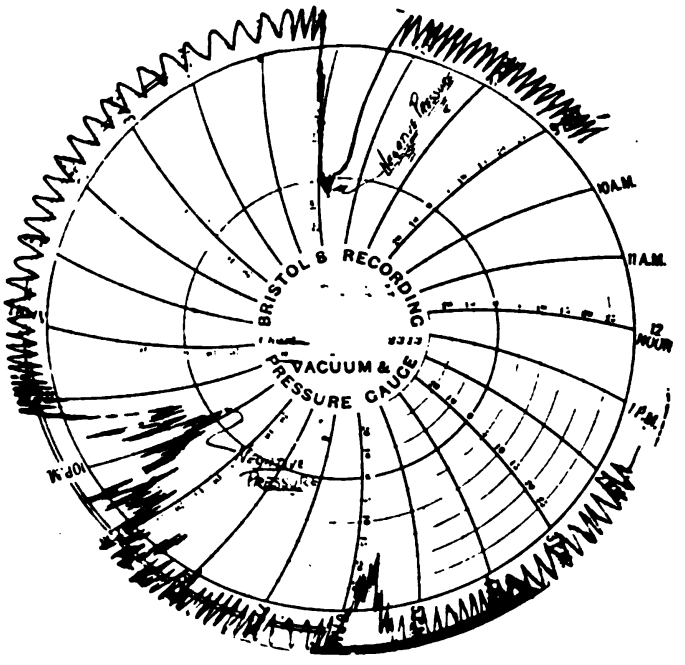
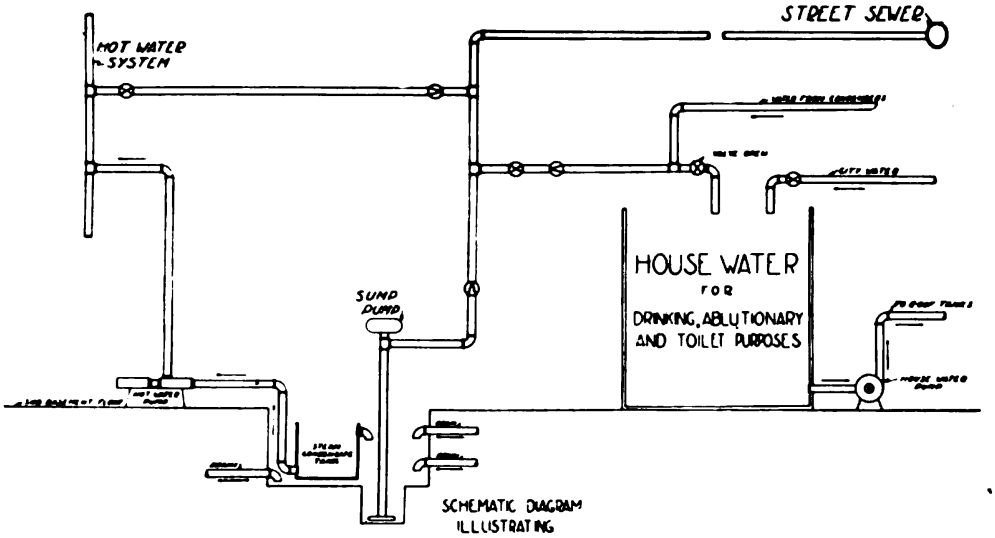



FIGURE 1. Pressure vacuum chart, 1345, 27 April, to 0925, 28 April 1945. Hot water riser. Shaft opening to Room —.

Abstract of an address presented before a conference on plumbing cross connections, sponsored by the Sixth Service Command, Chicago, 9 March 1945.

A serious hazard of similar nature was found in a building occupied by a private school which contracted to train Army personnel. The water supply system for this building consisted of a booster pump and a pressure tank located in the basement, which boosted the water pressure sufficiently to supply plumbing fixtures up to the eighth floor. Since the school was ordinarily closed on Saturday afternoon and Sunday each week, the building management shut off the power to the booster pump during this period. However, some students would work at the school during this period to catch up in their studies and, while there, would use the toilet fixtures. It was reported that as the fixtures were flushed, the water pressure would fall rapidly until it reached city pressure, which was only sufficient to bring water up to the fourth or fifth floor. During such time, it is apparent that a vacuum was formed in the piping above the fifth floor, and since none of the flushometer valves on the toilets were furnished with vacuum, it was possible to back-siphon the contents of toilets into the water supply system every time a toilet on the upper floors was flushed and thus contaminate water drawn from drinking fountains on lower floors. At the time of our survey, the toilet on the eighth floor was stopped up and the bowl was full of water and feces up to the top of the rim, thus creating an ideal condition for back-siphonage.

The policy of the Army is to discontinue the use of private well water supplies and the use of secondary water from condensers and hydraulic elevators because of the possibility of either becoming contaminated, and because of possible dangerous cross connections between these systems and the drinking-water




SCHEMATIC DIAGRAM
ILLUSTRATING
DEFECTIVE PLUMBING INSTALLATION
IN MOTEL CONVERTED FOR ARMY USE

FIGURE 2

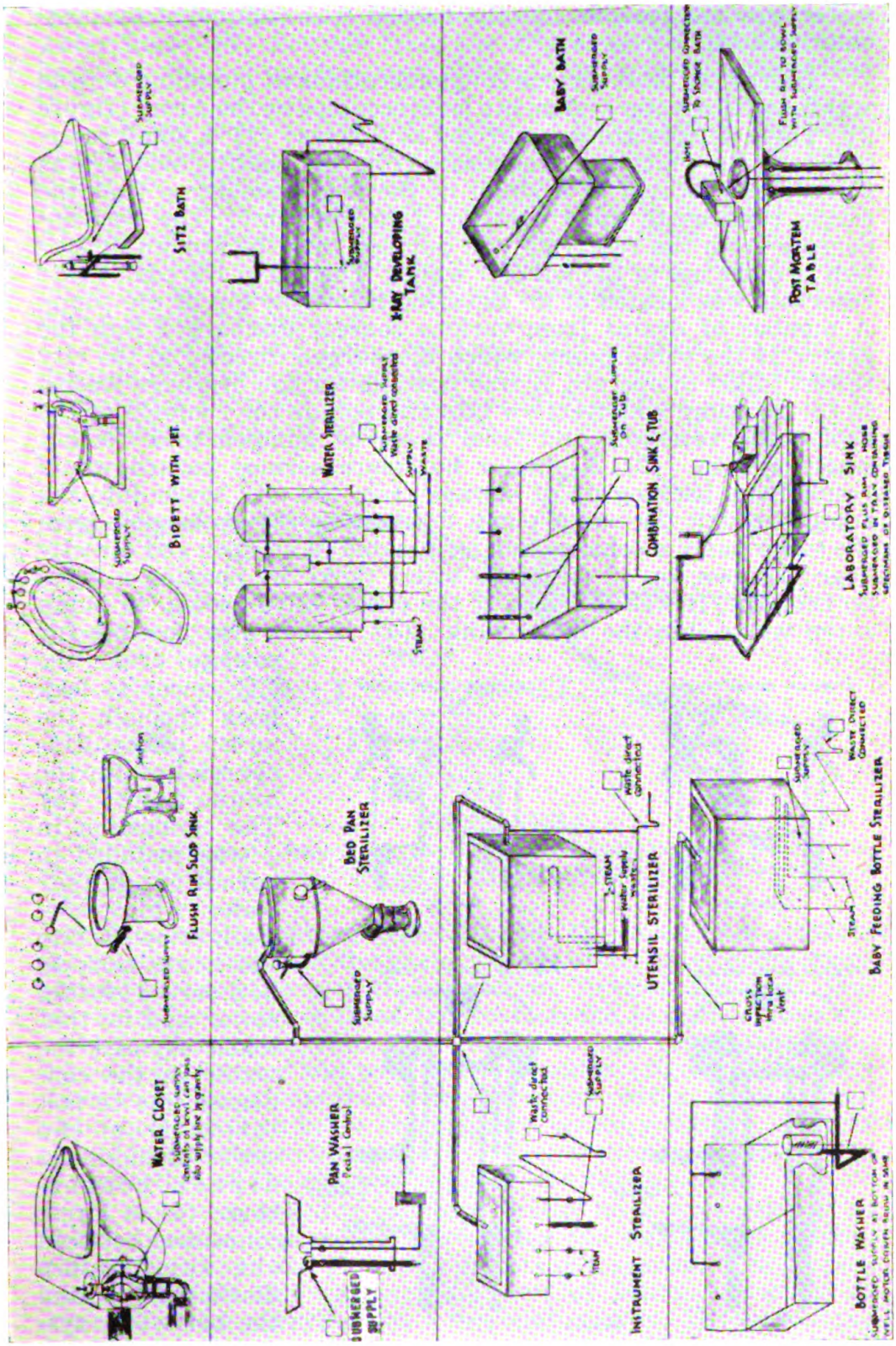



FIGURE 3. Violations in hospital fixtures and equipment.

supply. At one installation the abandonment of the secondary water was not feasible but the hazard was eliminated by post-chlorination.

One of the most serious conglomerations of plumbing defects was found in a water system in a hotel occupied by the Army (figure 2). These defects are summarized as follows: (1) A small reservoir tank, in which hot condensate from the heating system was stored, was located in a sump in the subbasement so that the excess condensate could overflow into the sump. The hot condensate from the reservoir was pumped into the hot water system to make use of the hot soft water. The top of the condensate reservoir was located at an elevation below the top of the sump. A number of drains from various sources discharged into the sump. If the sump pump, which discharged directly to the city sewer, failed to operate, it was possible for the drainage wastes to fill the sump and overflow into and pollute the contents of the condensate reservoir and from there be pumped into the hot water system. (2) A similar but more serious hazard would result from backing up of sewage from the city sewer into the sump through the sump pump discharge. (3) A branch from the sump pump discharge line terminated in an open end directly over the open top of the house water tank. By opening a valve on this line, it was possible, if the check valve leaked, to pump sump waste into the house tank. (4) It was also possible for sewage from the city sewer to leak back through the sump pump discharge line into the house tank. (5) The connection in 4 was installed to permit condenser water which normally flowed into the house tank to be diverted into the sewer and by that token exposed the water in the condenser line to pollution from the sewer through the direct connection. (6) A direct connection between the sump pump discharge line and the hot water system was for the

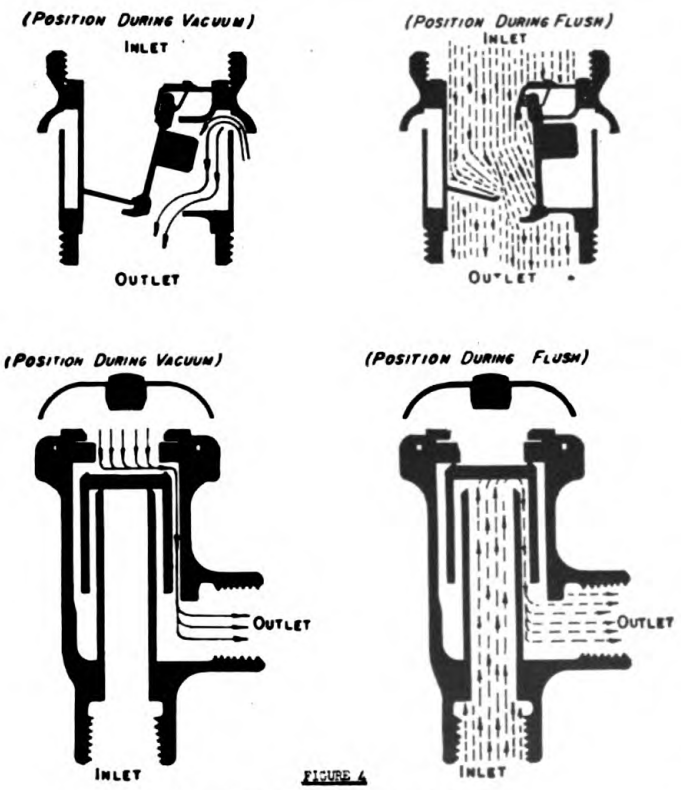



FIGURE 4

Typical vacuum breakers.

purpose of draining the hot water system to the sewer. Through this connection, it was possible to pump sump waste into the hot water lines. (7) Sewage from the city sewers could also flow back into the hot water system through the connection described in *6*.

All new hospital fixtures (figure 3) purchased by the Army under specifications are required to be protected against back-siphonage. Sterilizers, water stills, bedpan washers, and dental fixtures all have vacuum breakers incorporated in the fixtures. At one post where delivery of new dental fixtures could not be obtained, used dental fixtures purchased on the market were protected by installation of vacuum breakers (figure 4) in the water supply connections.

Sanitarians and plumbers frequently overlook the relative hazards from various types of plumbing defects and are inclined to consider them all as being equally dangerous. Often, it is impossible because of lack of funds, materials, and labor to cor-

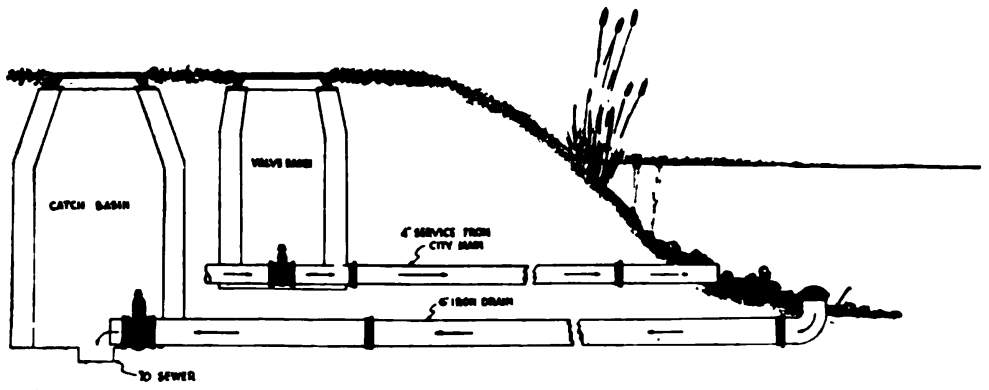


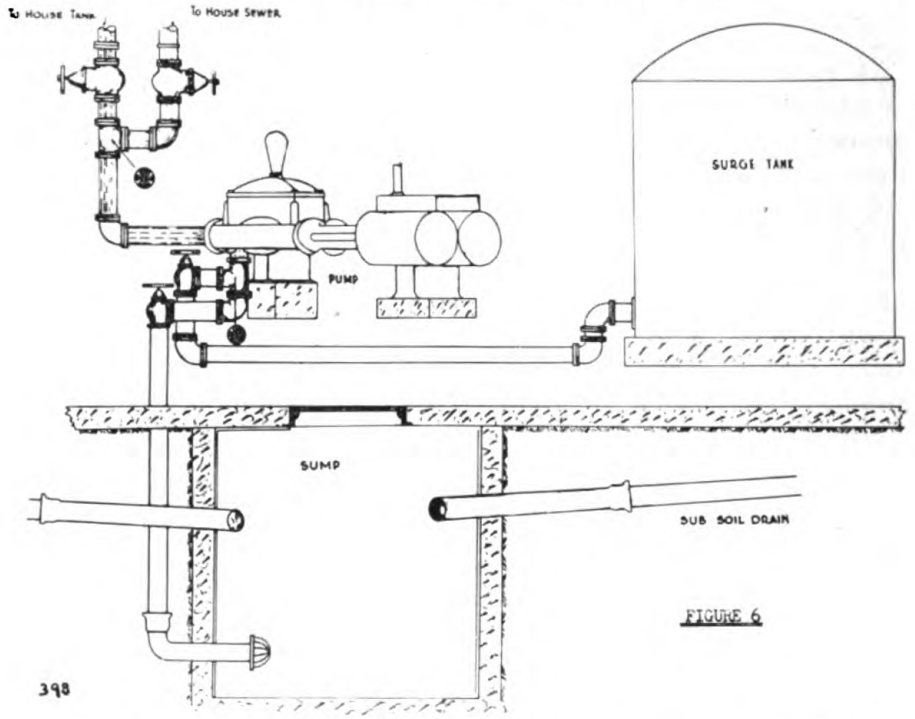

FIGURE 5

Study of typical water supply piping for pools, lagoons, ponds, etc., showing menace to the purity of city water supply through submerged connection.

rect at once all plumbing defects found. One must then evaluate the relative hazards of the various types of defective connections and direct his efforts to the correction, first, of the most dangerous defect, leaving those from which the hazard is more remote for later correction. A "hot" two-inch cross connection between safe water and polluted river water (figure 5) is many times more hazardous than a faucet whose orifice is submerged about one-half inch below the rim of a lavatory fixture. Efforts should be directed to break the direct connection immediately and to correction of the other when time and funds permit.

I have been asked to comment briefly on how one should go about to make a plumbing survey for the purpose of finding cross connections and plumbing defects in a system. The investigator will find the wearing of a suit of fatigue coveralls as essential as for carrying out a thorough survey. Before looking for plumbing defects, it is important that a flow diagram be

prepared which shows all booster pumps and reservoirs which carry the flow of the main potable water supply through the system and which also shows the piping layout and pumps (figure 6) and reservoirs on all secondary water supplies and other piping systems on the premises. This diagram will help the investigator in deciding where to look for cross connections.




A study showing the danger of dual or multiple use of a single pump unit.

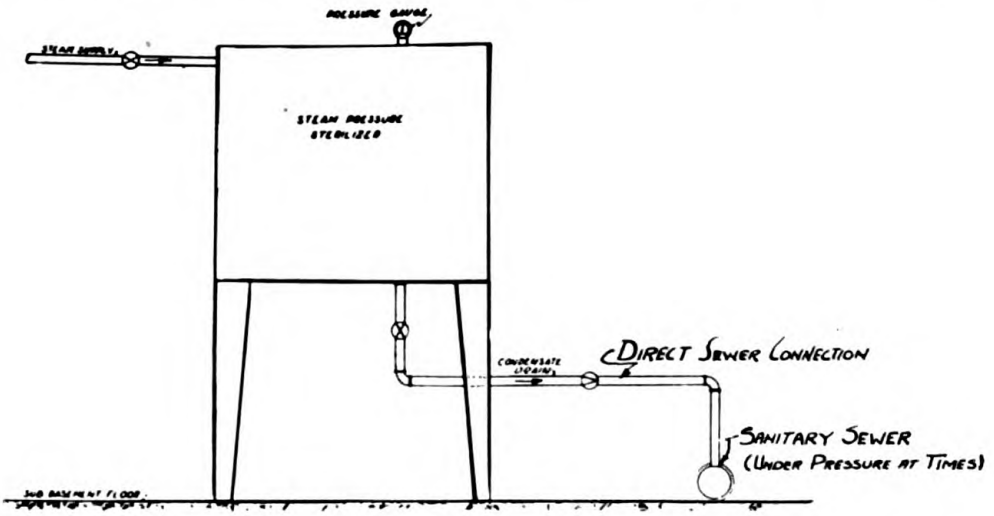



FIGURE 7. Unsafe installation pressure sterilizer in hotel converted for Army use.

Process equipment is then checked for submerged inlet connections and direct sewer connections (figure 7); plumbing fixtures are checked for possibility of back-siphonage, pumps are checked for priming connections, and checks are made for other types of plumbing defects. After some experience, one develops a "nose" for finding these defects.

A mistake often made in investigating a plumbing system suspected of causing illness is to place the blame on the first plumbing defect found in the system. We should guard against making such hasty conclusions. The illness might have been caused by infected food instead of by the plumbing defects. It is necessary to determine that conditions in the system were such as to cause the plumbing defects to become operative to cause pollution of the system before placing the blame on the particular plumbing defect. The mere existence of the plumbing defect is not presumptive evidence that it caused the illness.

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# Drugs in Treatment of Periodontal Disease

CAPTAIN IRVING BUCHIN
Dental Corps, Army of the United States

The cause of periodontal disease is complex and, in most instances, a combination of local irritating and mechanical factors as well as systemic disorders. The resultant symptoms are the manifestation of a lowered oral tissue resistance. This is evidenced by either one or a combination of the following: (1) change in appearance and a lowered tonicity of the gingival tissues, (2) pocket formation with resultant bifurcation involvement of the lower molars and trifurcation involvement of the upper molars, (3) changes in the amount, type, and distribution of alveolar bone, and (4) mobility of teeth.

Basically, periodontal treatment should consist in the removal of the etiological factors which contribute to a lowered tissue resistance and in the restoration and maintenance of the oral tissues to a condition of normal tone, function, and appearance. This necessitates proper diagnosis, prognosis, and treatment planning. Treatment must include: (1) proper toothbrush demonstrations at the onset of treatment, (2) removal of mechanical irritants supragingivally and subgingivally by scaling and curettage, (3) removal of undue stress on any one tooth or group of teeth in the various excursions of the mandible, (4) correction for proper contact points, equalizing the height of the marginal ridges, eliminating plunger cusps, and restoring individual tooth form, (5) detection and correction of abnormal habits involving the oral tissues, (6) necessary measures to correct systemic disorders, and (7) the removal and replacement of teeth prognosed as hopeless.

If periodontal disease were caused by a specific factor, we might anticipate the discovery of a drug that would act specifically on the etiological agent; however, most of the causes of periodontal disease are of a mechanical nature and primarily not a bacterial or parasitic infection.

Drugs are used to eliminate pockets, to improve the tonus of the gingival tissues, to combat superimposed bacterial infections, and to build up the general health and resistance of the patient. The local application of drugs to the mouth depends in a great measure on the absorbability of the drug; thus, alcoholic and aqueous solutions have an advantage over oily bases. The gingival tissues have a high vascularity and by drying the gingival surface we further enhance the absorption of the drug. Liquids are best applied by means of wooden applicators wound with cotton, or a pledget of cotton held in the beaks of a pair of college pliers. Powders are best applied by means of a powder blower, and mouth washes and irrigating solutions are best applied by means of a spray which can reach into the fissures and crevices of the gingival tissues.[1]

The following drugs are recommended in periodontal treatment:

1. *An epithelial solvent in pocket eradication.*[2]

℞ Sodium sulfide 17.5 gm.
Sodium carbonate ($Na_2CO_3H_2O$) 5.0 gm.
Water
Mix to make about 30.0 cc.

Blass states[3] that "cases chosen for treatment with an epithelial solvent should first be given the usual course of routine conservative periodontal treatment. The solution is applied on a twist of cotton or bibulous paper and carried into the pocket with a smooth broach or with a No. 17 explorer, the point of which has been broken off. The mouth is rinsed and after three minutes the solution is withdrawn and a second application made and continued for seven minutes. After withdrawal of the second application, a curette is used to remove the disintegrated epithelium and to further cleanse and smooth the root surfaces. The tissue is pressed lightly to contact the tooth root and held so for five minutes to allow clotting. The patient is warned to avoid brushing or other trauma to the treated area for three or four days. Traumatic occlusion is relieved before the patient is dismissed. The treatment is repeated in from seven to ten days if the pocket has not closed." The operator should use caution in application of this solution, since it is highly caustic. Cotton rolls are not used to isolate the teeth.

1. Thoma, K. H.: Oral Diagnosis with Suggestions for Treatment, 2d ed. Philadelphia: W. B. Saunders Company, 1943.
2. Accepted Dental Remedies, 6th ed., American Dental Association Council on Dental Therapeutics. Chicago: American Dental Association, 1940
3. Blass, J. L.: Chemicotherapy and Physiotherapy as Adjuncts in Conservative Treatment of Periodontal Disease, J. Am. Dent. Ass., 30:267-273, 1 Feb. 1943.

*Rationale.* The resultant caustic solution will dissolve the epithelial tissue within the pocket, thereby facilitating the removal of epithelium by curettes and consequent formation and organization of the blood clot to connective tissue. Thus the pocket is eliminated.

2. *Gingival and protective seal for use in pocket eradication (after Blass).*

| | | |
|---|---|---|
| ℞ | Gum copal | 16.0 gm. |
| | Gum mastic | 16.0 gm. |
| | Tr. myrrh | 20.0 gm. |
| | Ether | 20.0 gm. |
| | Collodion | 40.0 gm. |

Mix; make a solution and dispense in 8 cc. homeopathic vials.

The pocket is curetted and, if necessary, the epithelial solvent, sodium sulfide, is used as directed. The area is then isolated by means of cotton rolls and the tooth dried with a warm air syringe. The varnish is then applied by means of a pledget of cotton held in the beaks of a pair of college pliers to the gingival margin and the cervical portion of the tooth. The area is allowed to dry for two minutes. A wet pledget of cotton is then applied to the area and the resultant precipitate is patted into place. The seal should remain in place long enough to permit fibrous organization of the blood clot.

*Rationale.* The blood clot formed by curettage is sealed within the pocket by the varnish which is precipitated by water. The epithelial lining of the pocket has been destroyed by curettage and by the use of the epithelial solvent; the pocket is eliminated when the fibrous organization of the clot reattaches to the smooth root surface. The varnish prevents the washing out of the clot and the detachment of the clot from the root surface.[8]

3. *Drug used for edematous hypertropic gingivitis.*

| | | |
|---|---|---|
| ℞ | $ZnCl_2$ | 8.0 gm. |
| | Water to make 100 cc. of solution. | |

Cotton packings which have been immersed in an 8 percent zinc chloride solution are interposed by means of a pair of college pliers between the contact points and the buccal, labial, and lingual bulges until the tissues are blanched. Maintain the packs in place for at least three minutes. On removal, a resurgence of circulation takes place. The process should be repeated in ten days, and the patient is instructed in the use of the interdental stimulator and the toothbrush.

*Rationale.* The gingiva presents the characteristics of inflammation in periodontal disease as a result of mechanical or chemical irritation. Physiologically, we have a stasis in the vascular flow through the capillaries of the gingival tissues, followed by extravascular infiltration through the capillary wall and into the surrounding tissues as a result of a lowered permeability of the capillary membrane. The final picture is a lymphatic block in the tissues with consequent edema, swelling, bleeding, and perhaps fibrosis.

Pressure is so exerted by the pack application of the 8 percent solution of zinc chloride that all extravascular elements and these elements within the vascular system are forced out through both the lymphatic and the vascular system. "An anemia is produced which lasts from fifteen to twenty minutes. This results in an increased capillary permeability and a resumption of the circulating medium."[4]

4. *Drugs used for necrotic gingivitis or Vincent's infection.*

| | | |
|---|---|---|
| ℞ | Methylene blue | 1.0 gm. |
| | Brilliant green | 1.0 gm. |
| | Crystal violet | 1.0 gm. |

Alcohol (50%) to make 100 cc. of solution

The teeth are isolated with cotton rolls and dried by means of the warm air syringe. The dye is carried to the marginal gingiva by means of a pledget of cotton held in the beaks of the college pliers. Because of the low surface tension of the triple dye, it will spread quickly along the necks of the teeth and penetrate into the crevices and fissures of the marginal gingiva. The patient is instructed in the home care of the disorder—the use of an alkaline or oxygen-liberating mouthwash and avoidance of spicy, fried foods and smoking. A saline laxative is prescribed, preferably one tablespoon of Epsom salts in 8 ounces of water.

Some operators prefer the use of 10 percent chromic acid. This is applied in a similar manner to the dye. However, after two minutes a second neutralizing solution of hydrogen peroxide should be applied with the college pliers. A purplish, oxygen-liberating reaction ensues, and then the mouth is thoroughly rinsed with a 10 percent solution of peroxide.

In the more acute stages of necrotic gingivitis in which the patient complains of pain and malaise, and where there is an elevation in temperature and an enlargement of the cervical lymph glands, I suggest the Box treatment. This consists in the application of Churchill's tincture of iodine.

| | | |
|---|---|---|
| ℞ | Iodine | 16.5 gm. |
| | Potassium iodide | 3.3 gm. |

Alcohol (70%) to make 100 cc. of tincture.

Here again the tincture is applied like the triple dye. Caution should be exercised in preventing the tincture from flowing over the healthy alveolar or other oral mucosa. A 35 percent aqueous solution of silver nitrate is then applied in an equally cautious manner to those treated areas. "The chemical reaction between the two solutions results in the precipitation of insoluble iodide of silver, which seems to form within the necrotic tissue. This whitish film turns dark in the light and in thirty-six hours, as a rule, is cast off. It seldom leaves behind bleeding surface, all ulcerations except the large ones being covered, as a rule, with

4. Lundquist, G. R.: Periodontal Involvement and Its Management, J. Am. Dent. Ass., 32:298-307, 1 March 1945.

new epithelium. Furthermore, the rapid reduction of the attendant gingival inflammation is a particularly striking feature."[5]

*Rationale.* In Vincent's disease, fundamentally, we have a lowered gingival tissue resistance establishing a favorable environment for the proliferation of *Bacillus fusiformis* and the spirilla of Vincent and Plaut. Treatment should consist in first removing the exciting cause of the disease, thus eliminating the preponderance of Vincent's organisms in the mouth. Secondly, it should be borne in mind that the predisposing factors that resulted in a lowered tissue resistance must be detected and removed; otherwise, a recurrence of the disease can be expected, especially when the oral hygiene is neglected. There are three primary incubation zones for the Vincent organisms: (1) around the erupted or partially erupting wisdom teeth and especially beneath gingival flaps, (2) in the crypts of the tonsils, and (3) around the linguals of the upper anterior teeth. Irritation of the gingiva by facings of bridges or by poorly constructed crowns can be a predisposing factor. It is recommended that the patient be given a complete physical check after treatment of Vincent's infection.[6] The classification of the drugs that are used in the treatment of Vincent's infection is as follows: (1) caustics, such as the silver iodide formation in Box's treatment; (2) dyes, such as the triple dye which fixes the necrotic gingival tissues and the invading Vincent's organisms; (3) oxygen-liberating compounds, such as in the combination of 10 percent chromic acid and full-strength peroxide; and (4) alkalis, such as sodium bicarbonate. A 1 percent sodium ricinoleate has been suggested. Soap has been recommended as a valuable adjunct in the treatment of the disease, and it may be used in various forms. Mention should be made of sulfarsphenamine which is dissolved in 2 ounces of glycerin and applied to the area of infection.

*Vitamins.* A daily dosage of 0.5 gm. of cevitamic acid is recommended for cases of hypertrophy, edema, and congestion of the marginal gingiva where subclinical scurvy is suspected. Vitamin therapy should be continued for at least six months. It is best to take vitamins by mouth after each meal.

*Rationale.* Vitamin C seems to have a special affinity for the gingiva and a deficiency of the vitamin causes marked changes in the soft, fibrous, connective tissues and changes in the endothelium and skeletal structures. However, the therapeutic effect on gingivitis not caused by subclinical scurvy is debatable. Restarski and Pijoan[7] concluded that "the assumption that gingivitis, with or without pyorrhea, is on a scorbutic basis is unwarranted unless there is antecedent a present clinical evidence

5. Box, H. K.: Necrotic Gingivitis (Trench Mouth), No. 14 of the Bulletin of the Canadian Research Foundation. Toronto: University of Toronto Press, 1930.

6. Mead, S. V.: Diseases of the Mouth, 5th ed. St. Louis: C. V. Mosby Company, 1940.

7. Restarski, J. S., and Pijoan, M.: Gingivitis and Vitamin C, J. Am. Dent. Ass., 31:1323-1327, 1 Oct. 1944.

of scurvy." Roth[8] states that "Vitamin C, 500 mg. daily, will improve and maintain the health of the gingiva to a better degree than local treatment without vitamin therapy. Administration over a long period, e.g., a year or a year and a half, is beneficial and will do no harm."

It is my belief that patients with periodontal disorders have one form or another of nutritional deficiency. This is not a rash statement when one considers our daily diet of highly refined sugars and starches. That this deficiency is on a national scale was recognized when the addition of $B_1$ to flour for use in making bread was put into effect a few years ago. A non-detergent, vitamin-enriched diet of basic foodstuffs is essential to good health and to a normal oral environment.

CONCLUSIONS

Because of the complex nature and causes of periodontal disease, drugs should be used as an adjunct in treatment and in conjunction with scaling, curettage, equilibration of occlusion, and tooth brushing. The use of drugs alone cannot effect a permanent cure.

8. Roth, H.: Vitamins as an Adjunct in the Treatment of Periodontal Disease, J. Am. Dent. Ass., 32:60-66, Jan. 1945.

# The Recognition of Leptospiral Infections

CAPTAIN WILLIAM W. STILES
Medical Corps, Army of the United States

Leptospiral infections are more common than is generally realized. The first case recognized in continental United States was a laboratory infection in 1921. Only 12 sporadic cases were observed in this country during the following ten years; however, during the succeeding ten-year period, 1931 to 1941, there were 168 established cases. Many of these cases have been reported in the literature, but others, including 13 cases in my own series, have not. More than 300 additional cases are known in which a presumptive diagnosis of leptospiral infection was made on clinical and circumstantial evidence, but in these cases the laboratory proof is considered inadequate for a positive diagnosis.

An increased recognition of leptospiral infections, variously known as "Weil's disease," "spirochetal jaundice," "leptospirosis icterohemorrhagica," et cetera, has also been reported abroad. In the Netherlands[1] only 194 cases were observed before 1931, but in the next six years there were 739 cases. A similar increase was noted in the British Isles[2] where only 77 cases had been established before 1933, but in the next four years 142 cases

1. Walch-Sorgdrager, B.: Leptospiroses, Bull. Health Organ., League of Nations, 8:143-386, 1939.
2. Alston, J. M., and Brown, H. C.: Epidemiology of Weil's Disease, Proc. Roy. Soc. Med., 30:741-756, April 1937 (Abstracted in Lancet, Lond., 1:569-570, 6 March 1937).

were found. In almost every country where a study has been made, leptospiral infections have been found and the incidence of the disease has depended somewhat on the intensity of the search that was made for them.

Leptospiral infections were not well understood until 1914 when Inada and Ido[3] discovered the etiologic agent; then during World War I many cases were proved. Reports from all fronts revealed a high incidence of infectious jaundice among troops engaged in trench warfare, but it was not known how many of them were cases of leptospiral infections. As trench warfare increases the risk of exposure to rats, their excreta, and water contaminated by them, an increased incidence of rat-borne leptospiral infections in troops might be expected. Similar circumstances associated with some occupations have caused a greater frequency of the disease among ditchdiggers, sewer workers, bargemen, dock workers, fish handlers, slaughterhouse employees, miners, farmhands, sugar-cane cutters, and veterinarians. In these occupations, the increased hazards are so evident that compensation awards have been allowed in numerous instances.[4] Swimming and accidental immersion in water have accounted for a large number of cases.

Leptospiral infections may be expected to be more common than usual in the present war, but their exact number may be obscure because of the difficulties of laboratory diagnosis. In peacetime, leptospiral infections are more common than the reported incidence of the disease indicates, not only because of the difficulties of laboratory diagnosis, but because of the lack of familiarity with the clinical forms of the infection and because there is an extensive reservoir of leptospira in rats. From numerous surveys made throughout the world, it is evident that rats are the natural host of *Leptospira icterohemorrhagiae,* and that at least one-fifth of these rats are carriers and chronic shedders of the spirochete. Dogs are the host of another strain, *Leptospira canicola,* which is less virulent for man. Infected dogs, laboratory animals, and patients constitute a minor reservoir of the leptospira. The free-living leptospira found in water are of controversial virulence for man and animals. Occasionally human beings become infected from the bite of a diseased animal or by contact with its tissues. The usual transmission of leptospiral infections, however, is by intimate contact with rat urine or water contaminated by it.

The classical, severe type of leptospiral infection in which jaundice and hemorrhagic manifestations are conspicuous is known by most physicians. Many would not recognize the less severe types in which jaundice and hemorrhages are lacking, cases that may suggest sepsis, acute nephritis, aseptic meningitis,

3. Inada, R., Ido, Y., Hoki, R. Kaneko, R., and Ito, H.: The Etiology, Mode of Infection, and Specific Therapy of Weil's Disease (Spirochaetosis Ictero-haemorrhagica), J. Exper. Med., 23:377, 1916.

4. Stiles, W. W., and Sawyer, W. A.: Leptospiral Infection (Weil's Disease) As an Occupational Hazard, J. A. M. A., 118:34-38, 3 Jan. 1942.

epidemic hepatitis (catarrhal jaundice), yellow fever, malaria, blackwater fever, dengue, typhoid fever, typhus fever, influenza, and other infections. No case can be positively diagnosed on clinical findings alone.

### LABORATORY DIAGNOSTIC METHODS

Routine laboratory examinations may help in diagnosing leptospiral infections, but specific tests are required for confirmation. A moderate leukocytosis and elevated blood sedimentation rate are usual in the leptospiroses. Albuminuria and hematuria are common. The urea content of the blood is increased, and the degree of elevation is of prognostic value. The icterus index also has some significance in this regard. Serologic tests for syphilis are negative.

A conclusive diagnosis can be established by the reproduction of the disease in guinea pigs. During the first week of the patient's illness, leptospira may be recovered from the blood by animal inoculation. For this purpose, three young, white guinea pigs weighing less than 150 gm. are injected intramuscularly with 2 cc. of whole or citrated blood. The guinea pigs may be caged together, but are isolated from other animals and protected from wild rats or their excreta. Daily afternoon temperatures of the guinea pigs are taken, sterilizing the thermometer before use in each animal.

Infected guinea pigs develop a temperature of 100° F. (38° C.) or higher about the third day. Jaundice, general debility, and emaciation follow, and death occurs on about the tenth day. At necropsy, the characteristic findings are icterus and punctate hemorrhages of the viscera, especially the serous membranes, lung parenchyma, and kidneys. Macerated tissues and body fluids of the guinea pigs are used to propagate the leptospira in other guinea pigs and are also used to inoculate culture media. Tissue sections of the liver and kidney are stained by Levaditi's method to demonstrate the leptospira.

Darkfield microscopic examination of whole blood, serum, or plasma from either human or animal sources may be tried, but the results should not be considered infallible because of common artifacts, which are the more confusing because of Brownian movement. Furthermore, it is often difficult to identify leptospira with certainty in material that is known to be infectious for guinea pigs.

A simple medium for the cultivation of leptospira is heat-sterilized tap water, adjusted and buffered at a pH of 7.6, to which fresh rabbit serum is added. Using narrow test tubes (1 cm. diameter), 2.5 cc. of the tap water are placed in each, and 0.2 cc. of rabbit serum is added, using aseptic precautions. Growth proceeds at temperatures between 77° and 99° F. (25° to 37° C.). Inconsistent results may be expected with this simple medium and even with the more elaborate media.

Schüffner's modification of Verwoort's medium is prepared

as follows: To 1.5 liters of water, preferably rain or spring water, add 1.5 gm. of Witte peptone. After boiling, add 6 cc. of a phosphate mixture composed of 0.35 gm. of potassium phosphate (monobasic) and 1.33 gm. of dibasic sodium phosphate in 100 cc. of distilled water; boil the mixture again. Then add 300 cc. of Ringer's solution, composed of 2.40 gm. of sodium chloride, and 0.06 gm. each of calcium chloride, potassium chloride, and sodium bicarbonate in 300 cc. of distilled water. Boil the mixture once again. To this add 150 cc. of Sorenson's buffer solution (pH 7.2), composed of 72 cc. of monobasic phosphate (1.89 gm. in 200 cc.) and 100 cc. of dibasic phosphate (1.814 gm. in 200 cc.). Boil the mixture until precipitation is complete (twenty-five to thirty minutes), cool overnight in a refrigerator, filter, and autoclave at 15 pounds' pressure for fifteen minutes. The pH should be about 7.2. Before using, add 8 to 10 percent sterile rabbit serum, tube, and test for sterility. Serum tinged with hemoglobin may be superior to clear serum. Inactivation of the serum at 131° F. (56° C.) for thirty minutes may be advantageous.

After the first week of illness, leptospira are rarely found in the patient's blood, but may be recovered from the urine for a period of several days or weeks. It is essential that the pH of the urine is neutral or slightly alkaline when voided; if not, the patient should be given sodium bicarbonate, citrates, lactates, or other suitable medication to render it so. Darkfield examination of the urine is unreliable, for nonpathogenic spirochetes may be present in the urine of healthy persons, and artifacts are common. Culture methods are also disappointing. The best results are obtained by injecting the urine into guinea pigs, as for blood.

Specific agglutinins may be demonstrated in the blood serum a few days after the onset of illness and reach a maximum titer about the fourth week. Antibodies persist in a diminishing titer for a period of weeks or even months. Serologic tests are not only valuable in rapidly establishing the diagnosis in the acute case, but they are also the means of recognizing previous infections and latent cases. The agglutination test and other serologic tests for detecting antibodies in leptospiral infections are highly specific, no cross reaction occurring from bacterial infections or from other spirochetal diseases. During the course of illness, an ascending titer is expected; a persistent low titer suggests a previous infection. Agglutination titers as high as 1:75,000 or even higher are not uncommon in leptospiral infections, titers higher than are usual in any of the bacterial infections.

The *microscopic* agglutination test requires special equipment and technique. The antigen is a culture of viable leptospira, the density of which is such that 25 or more organisms are present in each field of the darkfield microscope when a drop of the culture is examined with the high-dry objective. A five-day-old culture is preferable to those of longer incubation. Serial

dilutions (1:5, 1:25, 1:125, 1:625, etc.) of the patient's serum are made, using the leptospiral culture as a diluent. After five minutes at room temperature, a drop of each of the mixtures of diluted serum and antigen is transferred in turn to a glass slide and examined with the high-dry objective without the use of a cover slip.

Agglutination is apparent when the leptospira are clumped together, or when several intertwine to form scattered small groups. The usual movements of the leptospira, as seen in the culture, are altered conspicuously, as though the organisms had been trapped in thin glue. Lysis of some of the leptospira may be evident. A distinct end point is usual. Although the microscopic method is time-honored, the antigens are difficult to prepare, a darkfield microscope is required, the technique is laborious, and experience is necessary to interpret the results.

A *macroscopic* agglutination test has been devised, and a commercially prepared antigen is now available in this country. The antigen consists of a formalized culture of leptospira, concentrated by high-speed centrifugation and containing a small amount of gentian violet. The test is a modification of the rapid slide technique, in which one drop of the antigen is mixed with one drop of the diluted serum on a clean slide and then gently agitated for a few minutes. A positive reaction is indicated by the appearance of light blue, feathery aggregates in the droplet. The same dilutions of serum used in the microscopic test are used in the macroscopic test. The sensitivity of the macroscopic test is roughly one-tenth of the microscopic.[5] It is sufficiently sensitive to be of value in the diagnosis of acute cases of leptospiral infection, although it may not be sensitive enough to demonstrate previous infections and latent cases in which the antibody titer is low.

Animal protection tests may be used to confirm serologic tests. For this purpose, at least three young, white guinea pigs are inoculated with 1 cc. of the patient's serum which has been mixed with an equal quantity of a culture of leptospira just before injection. A similar group of guinea pigs is inoculated with the leptospiral culture alone, or mixed with an equal quantity of normal human serum, to serve as a control. Guinea pigs protected by immune serum may have a transient fever, but survive without other evidence of disease. Guinea pigs that are not protected have a high mortality rate, approaching 100 percent in animals of less than 150 gm.

Young white mice (*Mus musculus*) may be used instead of guinea pigs for the protection tests.[6] In this instance, 0.3 cc. of culture and an equal quantity of diluted serum are injected into each animal. If a satisfactory culture of leptospira is not at

5. Starbuck, E. B., and Ward, T. G.: Comparison of a Recently Developed Macroscopic Agglutination Test for the Diagnosis of Leptospiral Jaundice with the Standard Microscopic Test, J. Infect. Diseases, 70:88-91, Jan.-Feb. 1942.

6. Larson, C. L.: A Protection Test in Mice for Identification of Leptospirosis Icterohaemorrhagica (Weil's Disease), Pub. Health Rep., 56:1593-1609, 8 Aug. 1941.

hand, a portion of kidney from an animal known to be infected can be macerated, suspended in saline solution, and injected in like quantity.

Human necropsy tissues, particularly liver and kidney, are macerated and suspended in a small quantity of sterile saline, and then 1 cc. of the suspension is injected intramuscularly into each of three young, white guinea pigs. Small portions of the tissue not exceeding 1 cm. in diameter are fixed in 10 percent formalin solution and histologic preparations made, which are then stained by the Levaditi method.

Of the diagnostic methods described, the most convincing is the reproduction of a fatal disease in guinea pigs, characterized by fever, emaciation, jaundice, and hemorrhages. Agglutination tests are quite reliable, the macroscopic method being more practical than the microscopic. Animal protection tests may be used to confirm the serologic tests. Cultural methods often fail. Tissue sections stained by the Levaditi method are trustworthy in experienced hands. Darkfield microscopy is unreliable.

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# Pulsating Hematoma

## Report of Cases

MAJOR JOHN D. MARTIN, JR.
Medical Corps, Army of the United States

False aneurysm or pulsating hematoma is one of the most frequent peripheral vascular conditions occurring in battle injuries. The early treatment of the injury requires judicious care if this complication is to be avoided.

The ideal mode of treatment of large vessel trauma is not feasible in most instances under existing circumstances. Because of the delay sometimes encountered and the massive type of injuries, the vascular damage cannot always be evaluated. Moreover, the necessity for the immediate control of hemorrhage in the presence of extensive damage to muscles, nerves, and bone frequently forbids a careful determination of vessel damage, with a planned repair of the defect. The damage to the vessel may be extensive and, if there is a large external wound, profuse hemorrhage follows. On the other hand, with a small wound of entrance by shell fragments or other missiles, massive hemorrhage in the part may result without much external loss of blood. It is equally important to be observant in both of these conditions. In the first, the urgency is the control of bleeding. In the second, the repair of the damage is necessary if preservation of the limb and the prevention of late complications are to be

Because of lack of space, six case reports have been omitted from The Bulletin. They will be included in the author's reprints.

achieved. The presence of shock frequently forbids the closure of large defects in the vessel. Therefore, the recourse is ligation both proximal and distal to the site of the trauma. The failure to close either or both ends may result in delayed hemorrhage, hematoma, and possibly a false aneurysm.

The anastomosis of torn vessels can occasionally be accomplished, but it should never be attempted except under ideal circumstances. The use of anticoagulants such as heparin and dicoumarin are extremely beneficial following vessel suture but may be definitely contraindicated. In the presence of massive soft-tissue damage, the possibility of secondary hemorrhage must constantly be borne in mind, and this may be the deciding factor in preventing the use of these otherwise beneficial agents.

The paramount feature in all traumatic surgery is saving the patient's life. Ligation of the bleeding vessel therefore is most essential when all other means of control are inadequate. However, the ligation of major vessels to extremities is not without tremendous risk of losing the limb. Experience with injuries, in this and previous wars, has substantiated this belief. The ligation of popliteal or of femoral arteries is accompanied by an extremely high rate of gangrene. The longer after injury before primary ligations are performed, the greater the opportunity for recovery of the limb. Collateral circulation has thus had an opportunity of organizing. This is particularly true in cases where partial severance of a vessel has occurred and some circulation is maintained.

Every effort should be made to maintain the circulation of the limb. The leg should be immobilized to decrease the nutritional needs of the part. The reduction of the temperature of the part to 30° to 34° C. decreases the metabolic requirements and does not produce destruction of the tissue. The lowering of the surrounding temperature by ice bags around the leg may best accomplish this. The application of heat is contraindicated because of its effect in increasing metabolism. Following the ligation of all major vessels of an extremity, paravertebral sympathetic block should be done, repeatedly if necessary. In some instances sympathetic ganglionectomy for increasing circulation must be instituted before the viability period is lost. The greatest benefit from the latter procedures is the elimination of the reflex vasospasm that so frequently accompanies trauma to large arteries. When large arteries are ligated, the accompanying vein should likewise be ligated. The rate of gangrene is reduced when the vessels are ligated and severed. The basis for this is the interruption of the autonomic nerve fibers which permit the development of reflex spasm. Even with all of these precautions after ligations, gangrene may follow.

False aneurysms are encountered in cases where the main vessels are not securely ligated and immediate hemorrhage is controlled by packing. The presence of infection with necrosis may produce secondary hemorrhage into the limb when an insuf-

ficient external wound is present. The blood extravasates into the part and clots at first. Later, if the mass remains present for any length of time, a true endothelial sac may be partially or completely organized. As long as blood is entering the mass, an expansile pulsation may be noted. However, when the area becomes overdistended and no further blood can enter, all pulsations cease. At that time the blood supply to the limb can be totally stopped by secondary compression of the artery as well as by an intraluminal clot. The part below the lesion will begin to swell and there will be more pain than before.

The development of such a process may occur at any time following the injury, but the period in which it is most often first recognized is from two to eight weeks. At this period the patient is being transported from the forward hospital to the rear and must constantly be observed in each installation through which he passes. The prediction of such a lesion cannot be made, but those with a history of initial profuse hemorrhage must always be viewed with greater suspicion. This may be more likely to occur where large wounds are present and the primary control of the bleeding is accomplished by packing. Following removal of the packing and the first change of a cast, a cavity may remain which makes an ideal site into which blood may escape. Undue swelling and discomfort of the parts, following the change of a cast, should always be noted and examined. The development of false aneurysms is frequently unrecognized because most war wounds of the extremities are incorporated in plaster. Recognition of aneurysms has been made weeks later, particularly when the swelling of the part has subsided.

The diagnosis of the condition is not difficult and undoubtedly the most important single factor is to consider the possibility in each case of penetrating trauma in the vicinity of large arteries. A mass may not be palpable, but when recent hemorrhage or impending rupture is present, the swelling may be great. With such swelling, pain is out of proportion to that previously experienced. After the sac is well developed, pulsations are seen. Pulsation is usually associated with a systolic bruit. The latter is somewhat inconstant but more frequently encountered than not. The pulsation and bruit are not usually present after internal rupture of the sac. The condition can be diagnosed in most instances before rupture has occurred, but occasionally it will not be recognized until the vessel has been exposed.

The problem is the differentiation of this condition from an abscess. This is not always easy, since all ordinary signs of pulsating hematoma may not be obvious. The only manifestations may be those of a systemic infection and of increasing swelling along the vessel. It is well, therefore, not to incise a fluctuant mass near a vessel, even if evidences of infection are present, until the probability of pulsating hematoma has been eliminated.

The treatment is somewhat divergent, depending on the stage of the lesion. In small, infected lesions an infrequent case

may be cured spontaneouly by occlusion of the vessel with currant jelly clot followed by fibrosis. It is well not to attempt immediate repair of these lesions unless there is evidence of impending rupture or marked pain. The longer operation can be postponed, the more likely it is that sufficient collateral circulation will be present. The optimum time is variable, but ideally from sixty to ninety days should elapse. The external wounds naturally must have been well healed and dormant infection must be excluded. Unfortunately, unless a well-organized sac develops, most wounds with extensive soft-tissue defect and even recently sutured wounds will disrupt and copious bleeding will ensue when necrosis or slough occurs. It is essential to operate early when there is a diminution of blood supply to the extremity with evidence of ischemia before the period of viability has passed. This may be shown by pallor, absent pulsations distal to lesion, swelling of the part, or lowering of the surface temperature.

The most important feature in operation on these lesions is to be able to control the bleeding from above. This can many times be satisfactorily done with a properly applied tourniquet, but in wounds of the upper thigh this is not always practicable. It is extremely essential that a dry field be present before operation is undertaken. Therefore, the main vessels should be exposed above the lesion in order directly to control the bleeding. A temporary tape or rubber band can be placed around the proximal artery and vein and removed later without danger. Thus the vessel can be accurately obliterated, whereas, when an approach is made through the original wound, attempt at occlusion may be accompanied by much difficulty. It is not always ideal to do a true arteriorrhaphy or an endo-aneurysmorrhaphy once the sac has been evacuated. This cannot be done when the rent in the vessel is extensive or the separation of the ends is great. If the vessel is lacerated, repair may be accomplished by the suture; however, the majority of war wounds will have segmental defects in the vessel wall. A careful evacuation of the hematoma must then be made with identification of the vessel ends. When the clots are removed, the occlusion of the proximal and distal portions can be accomplished. This can be brought about by carefully placed interrupted silk sutures in the vessel ends or ligation in the ordinary manner. The temporary tapes or bands on the vessel or tourniquet above are then released in order to ascertain the presence of further bleeding. The cavity left by the evacuated hematoma may be sprinkled with sulfanilamide and loosely packed with petrolatum gauze. It is important not to pack the cavity tightly, because the pressure of packing interferes with blood supply to surrounding muscles and the entire extremity. There should be adequate opportunity for drainage of blood, serum, or pus, particularly since most of these wounds are potentially infected. Primary closure of the wound is contraindicated when these cases are operated on as an emergency because of rupture or threatened rupture.

## CASE REPORTS

CASE 2. This soldier was struck on 9 December 1943 by shrapnel, in his left upper thigh. He also received an incomplete fracture of the left patella. Eight hours later, under ether anesthesia, incision of the penetrating wounds of the thigh was made and at operation severance of large muscular branches of the femoral artery was noted. These branches were ligated and the wound packed with sulfanilamide and petrolatum gauze. The progress was very slow; the leg remained swollen and the knee joint was aspirated once, obtaining much fluid. On 27 December, in fairly good condition, he came under our observation. The swelling of the leg had subsided. On 2 January the left thigh suddenly became painful and swollen from the groin to the knee. The previous operative site was completely healed. Expansile pulsation was noted but no thrill or bruit could be detected. An attempt was made to postpone operation, but on 4 January the previously healed operative scar disrupted in its central part and a small amount of blood and serum escaped. It was felt that immediate operation was imperative to prevent fatal hemorrhage. The extent of the lesion made it impossible to apply a tourniquet to the thigh. The femoral artery and vein were exposed just below Poupart's ligament, where extensive infiltration and extravasation of blood had taken place. The vessels were exposed with some difficulty. They were secured with braided silk, the previous incision was opened, and the clot evacuated. The site of rupture was at the level of bifurcation of the profunda artery which had been sutured previously with silk. The femoral artery and vein below the inguinal ligament were doubly ligated with heavy braided silk individually, and these vessels were then severed between ties. A very large cavity was left at the site of the hematoma. The adductor muscles in this area appeared dusky in color. The wound was sprinkled with sulfanilamide and a light petrolatum gauze pack was left in this opening. Immediately on return from the operating room the condition of the leg was satisfactory. Ice packs were placed around the leg but were not allowed to come in contact with the skin. At no time was there any evidence of insufficient circulation to the part, although the skin temperatures of the two legs varied four degrees for about two weeks. Healing of the wound was somewhat delayed because of the sloughing of a portion of the muscle, which had appeared necrotic at the time of operation. The patient remained in bed for about eight weeks. On 1 March the wound was practically healed and the patient was walking around with the aid of crutches. He has been evacuated to the zone of the interior and writes that he is walking with practically no disability. The wound is entirely healed and there is no evidence of any disturbance to his leg.

## COMMENT

Of seven cases of false aneurysms, three involved the femoral artery, two the anterior tibial, one the profunda, and one the radial. These cases represented the problems encountered. One femoral artery ruptured with loss of considerable blood, necessitating amputation of the leg. Three others were cases of impending rupture and required immediate surgery. One of the anterior tibial arteries apparently healed spontaneously while under observation. However, it is too early to be sure this condition is completely cured and it should be observed longer. It was necessary to operate on all of the patients except one before it was felt safe that sufficient collateral circulation had occurred. One patient with a saccular type of false aneurysm was oper-

ated on after sixty days and it was possible to do an obliterative endo-aneurysmorrhaphy with preservation of the circulation through the vessel.

## SUMMARY

1. The importance of recognition of pulsating hematoma is emphasized, because of the frequency of the lesion in battle casualties. Through interference with the circulation of an extremity, pulsating hematoma threatens gangrene of the part; rupture may result in fatal hemorrhage.

2. It is not always practicable to perform the ideal type of blood vessel repair in battle casualties; consequently, the frequency of ligations remains high, with the constant danger of subsequent gangrene.

3. The diagnosis of pulsating hematoma can be made by the presence of swelling, pulsation, and systolic bruit over the site of an artery. All of these conditions may not be present. A pulsating hematoma is frequently infected and must be differentiated from an abscess.

4. Operation should be deferred as long as possible, provided that no interference with the blood supply is demonstrated. Delay is paramount for the purpose of promoting collateral circulation. Operation may become urgent upon occurrence of swelling, marked pain, or impending rupture. Emergency operation is by no means the most satisfactory method of handling these conditions.

5. The vascular lesions of most battle casualties are not amenable to repair of defects of the vessel walls and do require ligations of the afferent and efferent vessels into the hematoma, with or without attempt at obliteration.

6. The sac can best be obliterated early by evacuation, closure of vessels, and loose packing, allowing healing by granulation. Following obliteration of a sac either by aneurysmorrhaphy or evacuation and ligation of the vessels into the sac, the preservation of the limb should be attempted by means of increasing collateral circulation. This may be effected by sympathetic paravertebral block or ganglionectomy. The use of heat is contraindicated.

7. No attempt has been made to present the entire problem of aneurysm. The pressing question in the forward area is the emergency care of these conditions. The most frequent is pulsating hematoma with rupture or impending rupture.

8. Few cases of aneurysm should be operated on in this theater, but one should be familiar with the emergency measure for their treatment.

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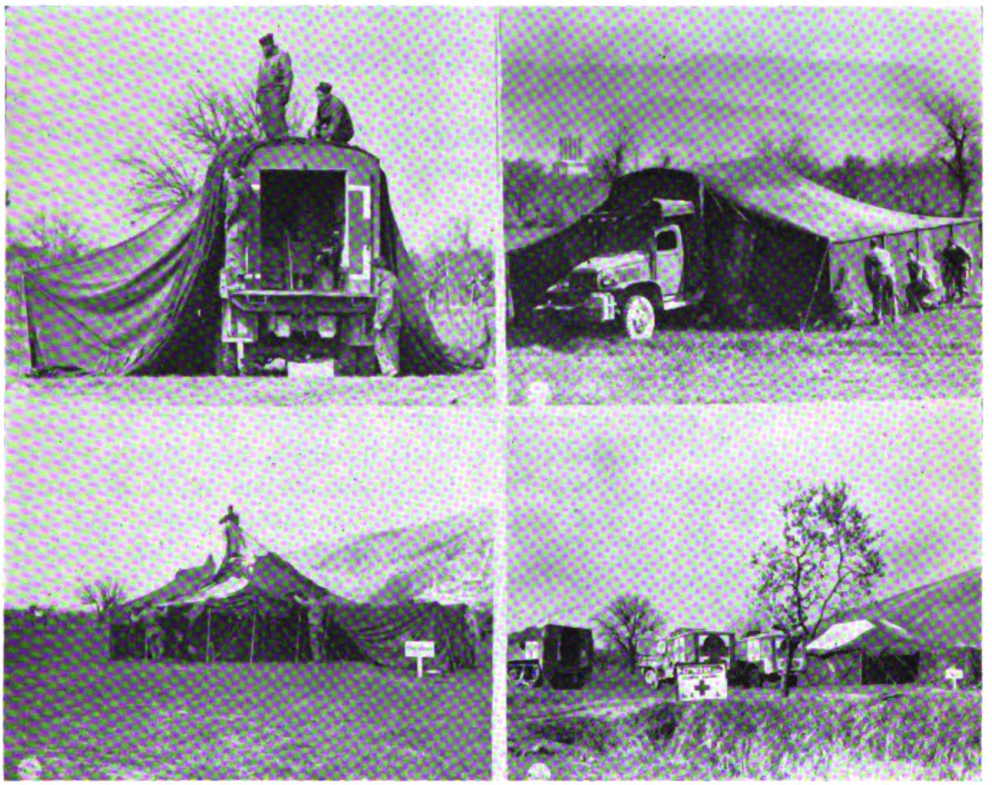
**Additional Hospital Facilities.**—Construction of convalescent hospital facilities at the Percy Jones General Hospital, Battle Creek, Michigan, has been authorized consisting of conversion of existing facilities at Fort Custer to provide a convalescent hospital for 6,000 men—recreation building, outdoor athletic facilities, and alterations to existing buildings. The authorized expenditure is in the amount of $1,205,000.

## SURGICAL UNIT WITH ARMORED DIVISION



Top, left to right: (1) Arrival at a new area of a medical battalion surgical unit with the First Armored Division, Fifth Army, in Italy. The tents which are carried on the cab of the surgical truck are being rapidly set up. (2) Within 15 minutes after arriving, the tents are up and the unit is ready for operation. (3) This surgical unit, which is equipped to care for casualties that otherwise would not reach an evacuation hospital in time for surgical aid, prepares to move on to another area. (4) Again ready for operation after arriving at a new area.

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An evacuation hospital in the U. S. Ninth Army area west of the Rhine, 24 March 1945. Signal Corps photograph.

# Importance of Careful Selection of Soldiers for Ligation of Varicose Veins

CAPTAIN WINFIELD L. BUTSCH
Medical Corps, Army of the United States
and
LIEUT. COLONEL JAMES C. HARBERSON
Medical Corps, Army of the United States

We selected for study 98 consecutive cases of varicose veins in soldiers in which the varicosities were treated by operation. They were examined and treated prior to S.G.O. Circular Letter No. 72, dated 17 March 1943, and were chosen for operation because they had varicose veins with incompetent valves and complaints referable to their legs. At that time no other basis for selection was employed. Our findings confirm the wisdom of the policy stated in this directive. Only 35 from this group remained in camp long enough for us to reexamine them three months after operation.

## OPERATIVE METHOD

The operative method used was the usual ligation and section of the long saphenous vein at its junction with the femoral, together with ligation and section of the commonly found tributaries of the saphenous at this point. Three to 5 cc. of 5 percent sodium morrhuate were injected in a retrograde direction in the distal saphenous segment. When incompetent communicating veins or an incompetent short saphenous vein were found, they were also ligated.

## METHOD OF INTERVIEW

When the soldier reported to the clinic for this study, he was asked whether or not his operation had given relief, whether his legs were stronger than before operation, and if he was able to carry on the full duties of an infantryman. We were startled to learn that 25 of the 35 soldiers examined complained of more difficulty with their legs following vein ligation than before the operation.

The following quotations are from their answers: "Legs feel dead when I wake up at night"; "Legs tremble and shake, which prevents my hiking"; "Legs sweat all the time"; "Legs ache from mid-thigh to calves and the knees buckle in"; "My day is done at noon"; "Legs and ankles swell"; "Soreness back

Major Paul T. Cash, of the Neuropsychiatric Section, Station Hospital, Camp Carson, Colorado, and Captain Edward D. Greenwood, formerly of the Neuropsychiatric Section, gave generous advice and aid in this study.

of knees prevents all duties"; "Get a heavy feeling in thighs, and the calves expand causing a shorter stride"; "Tired all of the time, bottom of feet and calves numb, legs itch, have to force myself to walk"; "Knees feel as if they were getting bigger. Body wants to sleep at night, but legs want to keep moving"; "Not much feeling in leg. Can't hike—have to drop out after two miles"; "Cramps in scar in groin, leg goes to sleep after I sit down, can't take an ordinary step, can't stand at attention"; "Any rapid movement causes a sticking like a needle in the leg"; "Seems as if all the feeling goes out of my legs when beginning a hike."

This multiplicity of complaints following a well-established operative procedure seemed incredible since on careful examination of each soldier for obliteration of veins and the presence of phlebitis and swelling, we found 31 of the 35 to have perfect surgical results with complete obliteration of the veins. In two, communicating veins had not been sectioned, leaving a few remaining varices. In one, in which the short saphenous was ligated, there were small varices in the long saphenous. One varix was due to failure of the operator to ligate the superficial circumflex iliac vein. No instance of postoperative swelling of the leg was found. Thus, there was no physical evidence that the surgical procedure had been inadequate.

A good result must enable a soldier to keep up in all his unit training. This is the prime reason for corrective surgery in recently inducted soldiers. As the 35 soldiers were infantrymen, their training required vigorous exercise of the legs. The 10 men who reported good results stated that their legs felt as well as or better than ever before. One of the imperfect surgical results, in which an incompetent communicating vein was still present, occurred in a soldier who obtained maximum benefit.

What were the reasons for the discrepancy between good surgical results and the actual relief of the soldier's complaints? When we questioned the soldiers from a psychiatric viewpoint, a correlation between emotional maladjustment and the persistence of symptoms became evident at once. An hour was devoted to discussing with each soldier his past history and his various adjustments to environmental situations, including his Army experiences. This discussion fell into six general topics.

The most fruitful subject dealt with multiple unrelated complaints. The soldier was questioned about nervousness, headaches, dizziness, weakness, gastro-intestinal complaints, hyperhidrosis, other aches and pains, and whether or not he felt these symptoms were aggravated by Army life. Did he feel inadequate as a soldier? What were his reactions to authority? Separation from home and family and the necessary financial adjustments were discussed.

A family history was obtained with particular reference to epilepsy, alcoholism, neurotic disorders, psychoses, and suicides. Inquiries were made concerning his father and mother, his attitude toward them, and any history of an early broken home situation. The soldier was asked if anyone in his family had varicose veins or "leg troubles" similar to his own. A school record was obtained. At what age did he enter school and what was his age at completion of schooling? Was he a superior, average, or poor student? His attitude toward teachers and the other pupils and his participation in extracurricular activities were discussed.

A work record was obtained, including the type of work, length of time he remained in one job, an estimate of his ability to maintain an adequate income, the amount of time lost by illness or "nervousness," and his attitude toward his job.

The fifth subject was a series of questions intended to uncover conduct disorders. Had he ever been arrested or served a sentence? Had he ever been in automobile accidents? Did he use alcohol? Any record of A.W.O.L., company punishment, and courts-martial was also obtained.

A series of questions dealt with social relationships and his previous personality make-up. An attempt was made to gain some idea of his psychosexual development, his ability to make friends, his interests, and his social attainments. An attempt was made to evaluate the social assets or specific deficiencies of the individual.

## REASONS FOR RESULTS

When the answers to these questions were summed up, the reasons for the large number of unsatisfactory results became evident. Many of the men with poor results had multiple physical complaints. They gave a history of "nervousness," headaches, weak spells, irritability, dizziness, easy fatigability, and multiple aches and pains. The varicosities could not be more than a part of the patient's disability and frequently an unimportant part in the face of a well-established neurosis. In such cases operation cannot be expected to improve their efficiency. Many of the bad results occurred in soldiers who had never had the ability nor the perseverance to hold a steady job. When this type of man presents himself for treatment of varicose veins, one may be doubtful if surgical obliteration of the veins will increase his value to his organization. Conduct disorders, such as frequent drunkenness or a history of frequent arrests, existed in many of the soldiers showing poor results. Where conduct disorders were present, the soldier was classified as a psychopathic personality and his symptoms were considered neurotic in character and secondary in importance. In many of these cases the symptoms represented a more or less conscious effort on the part of the individual to capitalize on a visible defect to escape duty. Operation in these cases only helps to "crystallize" and fix their complaints.

There was a positive family history of "nervous breakdown," psychosis, suicide, or alcoholism in many of the soldiers whose symptoms were not relieved by ligation.

## DISCUSSION

When a medical officer considers operating on a soldier with varicose veins, he is facing a different problem from that found in routine civil practice. These soldiers are young and for the most part have simple varicose veins uncomplicated by phlebitis and edema; therefore, we should expect their symptoms to be minimal. During exercise there may be a slight, ill-defined sense of heaviness in the legs, but this is never severe, as exercise should temporarily improve the circulation. At rest, varicose veins may be the cause of some cramping sensation in the calves of the legs.

| Cases with poor results | |
|---|---|
| Psychiatric questioning revealed | Cases |
| 1. Multiple complaints | 19 |
| 2. Lack of perseverance | 12 |
| 3. Conduct disorders | 10 |
| 4. Family history of neurotic traits | 9 |
| Total | 25 |

There was a positive history in at least one of the above groups in all cases with poor results.

| Cases with good results | |
|---|---|
| Psychiatric questioning revealed | Cases |
| Normal psychiatric background | 10 |

Since simple varicose veins present mild symptoms, it is well to regard with suspicion the soldier with varicose veins and a multiplicity of complaints. When this type of soldier finds himself in a too difficult situation, he may seek refuge behind any excuse to escape that situation. This apparent willingness to seize on any excuse may be, and often is, an unconscious mechanism which seems to him rational. An unwillingness to carry on is frequently manifested by exaggeration of any unpleasant feelings arising in the legs. In this type of patient, while ligation and retrograde injection will correct his disturbed circulation, operation will not make him a more efficient soldier. We now recommend the reassignment of such a man to duties not involving forced use of the legs and will not consider surgical treatment until after he has made a satisfactory adjustment to his new role in the Army.

The 10 men who reported good results were found in every instance to have a good record from the psychiatric standpoint. Under questioning they proved themselves stable, ambitious, and perfectly willing to carry on without any particular attention to their prominent veins. This type of soldier is more likely to be conscious of his veins as a visible defect rather than as a cause of any complaint. These men are often advised to "have their veins fixed," but they are prone to ignore them.

The reason for failure in the other 25 soldiers is that the primary cause of disability is a neurotic illness in which the

varicose veins are the only objective finding among a whole constellation of symptoms. Thus, the presence of varicose veins is not in itself an indication for surgical treatment. The demonstration of the presence of multiple complaints, indicative of a neurotic disorder, and of undesirable personality traits is in most cases a contraindication for surgery unless the surgery is directed toward the control of organic changes, such as thrombophlebitis or ulceration. Our experience demonstrates that the obliteration of varicose veins cannot be expected to relieve the soldier's complaints in the presence of definite neurotic symptoms.

The decision to operate for varicose veins should be made only after one is certain that the soldier is not disabled by a neurotic disorder and that he does not manifest undesirable personality traits. It is now our practice to have psychiatric consultation before surgery, and we do not operate on soldiers with varicose veins when the psychiatrist does not approve.

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# Filariasis in the White Man

H. NEUMANN
Medical Officer, Apia, Western Samoa

The problems of filariasis gain new importance by the vast number of white people exposed to infection and necessarily many cases of filariasis will be seen in temperate climates in people returning from the endemic areas. Filariasis due to the worm *Filaria bancrofti* occurs in all tropical countries, but the disease is most prominent in the central Pacific islands, where malaria is absent. In these islands the great majority of the native population is affected and the incidence among white people is higher than in any other area. A considerable percentage of temporary residents will, under unfavourable conditions, become infected and show symptoms of early filariasis.

The reaction of the new host to the infection is varied; some individuals never show any reactions or symptoms, even when heavily infected. Microfilaria carriers with a high microfilaria count, who have lived in endemic areas for many years, may never have had any noticeable symptoms.

If symptoms do arise in early filariasis they can usually be classed as belonging to one of three types: (1) the allergic type; (2) the streptococcal superinfected type; (3) the staphylococcal superinfected type.

1. A diffuse oedematous swelling of a limb appears; the skin is dense and white; leg or arm may be affected, only one limb at a time. There is little or no malaise, no pain, very little

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or no rise of the temperature. The patient may be needlessly upset by the impression of having the first stage of elephantiasis. The attack lasts for several days or over a week, and then the swelling gradually subsides, and the shape of the limb returns to normal. The acute manifestations of filariasis are considered to be reactions of the tissue to dead filarial worms in the lymphatics, and this first type of attack can be explained as an allergic reaction to a dead worm. Early filariasis of the allergic type cannot be observed in the natives. They have been infected for generations and throughout their whole lives and as a result the filarial worm apparently causes no allergic reaction in them. It does occur in temporary residents, usually not before the fifth month after arrival in the endemic area. The attacks may be repeated in rare or frequent intervals, but the prognosis remains good. There is no treatment required and the swelling resolves itself. An elastic bandage or elastoplast may be applied in the second week if still required, and the limb may be raised.

Another localization of this type of early filariasis is in the scrotum; the symptoms are analogous. There is little or no malaise, some slight pain, and a swelling that appears like an epididymitis, orchitis, or funiculitis, or the scrotal skin may be affected.

2. A second type of early filariasis occurs frequently in natives and in white people and is characterized by a lymphadenitis and a following lymphangitis. Red streaks on the skin are visible; more rarely a diffuse, intense red discolouring appears in the affected area, looking exactly like an erysipelas, and there may be a diffuse swelling. This type is due to a superinfection by a streptococcus. Its starting point can again be considered to be a dead filarial worm, and infection occurs by way of the blood stream. According to the severity of the attack, the patients have slight or high fever; there is malaise, pain on touch, and swelling in the regional lymph glands, which often precedes the lymphangitis. The attack may last for several days or over one week, and it may leave the patient in a debilitated state for another week.

Also, this type affects usually the limbs or the scrotum, rarely other regions such as breasts, ears, labia. These attacks are well known to all residents of the central Pacific islands and are called in Samoa "mumu," which is the Samoan word for red. A frequent repetition of attacks of this type over years leads gradually to elephantiasis if the patient, being warned by several attacks in one region, does not leave the endemic area in time. The locality of a dead worm is a place of minor resistance to any bacterial invasion, and it is not infrequently noticeable that the first attack of this type follows a slightly sore throat, or some infected minor injury. Women who are generally less exposed to and suffer less from septic wounds are also more rarely affected by bacterial superinfection in filariasis. Often the origin of the bacterial infection cannot be traced, but bacteriological examination from the inflamed tissue reveals a streptococcus.

This type of attack responds to the sulphonamides, particularly if they are given early, about three grams daily for several days.

3. A third type is far more frequently found in natives than in white people; it is a staphylococcal superinfection, with fever, local pain, and more localized swelling and later on often fluctuation. If very small, the focus may be reabsorbed, or otherwise if fluctuation appears the attack may lead to an abscess. The localization is again usually in limbs or scrotum. The reason why natives are more often affected by this type than whites may lie generally in the frequency of staphylococcal bacteraemia in the natives; boils are extremely frequent and so are infected purulent wounds. The attack caused by staphylococcal superinfection does not respond to sulphanilamide drugs, but an incision leads to quick recovery if the spontaneous absorption is delayed. Also repeated attacks of this type do not lead to elephantiasis.

Filarial attacks of any type may be observed in or after the fifth month of exposure, but swelling of any lymph glands with slight pain on touch may occur as soon as six weeks after arrival in the endemic area.

The *late symptoms* of filariasis, elephantiasis and related forms of chronic lymph stasis, follow numerous attacks of the streptococcal type over years and are found in Samoa with corresponding frequency among natives and long-time-resident whites, and they occur in white men and women. Scrotum, legs, and arms, in decreasing order, are mainly affected. The swelling appearing during the acute attack, if repeated many times in the same organ, seems less inclined to go back to normal during convalescence. Once the acute attacks cease, as, for instance, some time after having left the endemic area, no further increase of an elephantoid swelling need be expected, an existing elephantoid state may even lose its turgidity, the elephantoid tissue may gradually become flabby and the skin loose.

Very rarely an increase of elephantiasis, also without further attacks of filariasis, can be observed if the regional glands and lymph vessels were damaged at an operation or the lymph flow interfered with by subsequent scar formation.

The search for microfilariae in the blood as a proof of filarial infection in temporary residents in an endemic area is of no practical value because of the late appearance of the microfilariae in blood samples; they are usually not found before the seventh year after infection, which corresponds to the fact that also in native children in the central Pacific islands microfilariae are rarely found before the age of seven, although infection certainly takes place from their earliest days of childhood. It is likely that the *Filaria bancrofti* reaches maturity and begins to produce microfilariae during its second year of life. The only explanation that can be given for their late appearance is the fact that the microfilariae are life-born and their size and degree of development set a limit to the rate of their production; it may

take many years to produce a sufficient number of microfilariae to make them obvious in any odd sample of blood examined. In my own experience, the earliest finding of microfilariae in a white person was seven years after his arrival in the endemic area. In most cases of moderate infection this stage may never be reached and the blood may consistently remain negative on examination. Although there are living adult worms in the lymphatics and probably microfilariae in the blood, they are in too small numbers to be found. It is, on the other hand, imaginable that if many samples of blood are examined, if several cubic centimeters are taken for examination and dehaemoglobinized instead of the usual 20 cu. mm., and if the case is very heavily infected, that microfilariae may be found before the usual seven to ten years, theoretically even within the second year after infection. It is probably a gradual filling up of the blood with microfilariae that takes place over years. A female adult worm, observed under the microscope, may appear to give continuous birth to swarms of microfilariae, but it is unlikely to be the normal rate of reproduction and represents probably a miscarriage of not quite mature microfilariae under the abnormal conditions.

While the blood is steadily filling up with microfilariae, the number of adult worms in the patient may also increase at the same time due to continuous reinfection. But that this increased infection is not solely responsible for the growing number of microfilariae can be deducted from the history of people who, after having lived there for many years, left an endemic area—being negative for microfilariae—and became positive years later, without any possibility of additional infection.

If adult worms are producing microfilariae in a confined space, as in the tunica vaginalis, microfilariae may be found in the hydrocele fluid already in the second year after infection.

The mean microfilarial count taken in Samoa on a large group of the native population gradually increases up to the age of about 15, and from then on more or less remains stationary. This would suggest some relation to the duration of the life cycle of the worm; as the infection rate remains approximately unchanged, the combined life span of an adult worm and its microfilariae may be about fifteen years. The degree of infection in children is gradually seen to increase with advancing age and after 15 a certain equilibrium is established between the reinfection rate and the combined life span of the filarial worm and its circulating embryos. Correspondingly, microfilariae may also be found in heavily infected individuals up to fifteen years after departure from the endemic area.

A filarial worm may live or die and be absorbed or calcified without provoking any symptoms, and the suffering from any symptoms of filariasis is not related to the heaviness of the infection but to superinfection or an allergic reaction of the individual. A very heavy infection and a high microfilarial count may be unnoticed by the affected individual. The only symptoms that

can possibly be related to the presence of microfilariae in the blood are giddiness, a frequent complaint in endemic areas among otherwise healthy individuals, and rarely the occurrence of retinal haemorrhages without other explanation.

The *diagnosis* of early filariasis must mainly rely on the clinical symptoms that complicate the infection. The skin tests have so far been unreliable; eosinophilia, usually present, may be due to simultaneous infestation with intestinal parasites, or it may be absent.

In the central Pacific islands the microfilariae are nonperiodic, probably adapted to their vector, *Aedes variegatus*, a day-biting mosquito, as suggested by Buxton.[1] The day-biting habit of the vector explains also the much higher incidence of the disease in white people in this area, as the protection against a night-biting vector is more effective; besides that, there is also less segregation between the white and the native population in Polynesia than in other parts of the tropics.

Practically the only way of *prevention* is protection against mosquitoes. This comprises in the first line the cutting down of the undergrowth and of bush near the houses and huts to keep the mosquitoes away, as *Aedes variegatus* has not a long range of flight; furthermore, the use of effectively netted-in houses, and the other well-known means of mosquito control, check on their breeding places and on swamps, spraying, and the use of mosquito-larvae-eating fish.

If in wartime with the necessity of camouflage the living area cannot be cleared of bush and the conditions of life expose more to infection, the incidence of filariasis is higher than ordinarily among white people.

The danger of introducing the disease into countries of temperate climate by the return of patients infected with filariasis is practically nil. None of these patients after a residence in an endemic area of several years or less is a carrier of microfilariae, and even if after many years some should develop microfilariae they would be insufficient to form a reservoir for the necessary continuous mass infection of mosquitoes.

The *prognosis* as to the later development of elephantiasis is good in the first and third (allergic and staphylococcal) types of filarial attack, and attacks of these types do not warrant departure of the nonnative patient from the area.

The prognosis is also good after several attacks of the second (streptococcal superinfected) type, but the occurrence in one region of about three or more attacks, according to their severity, with lymphangitis and fever, should be taken in casual residents as sufficient warning to leave, if possible, the endemic area.

This refers to cases in which the limbs are affected. If the genitals are involved, any type of attack, if not very mild, may make it advisable to leave the area. Also, if the attacks in the

1. Buxton, P. A.: Researches in Polynesia and Melanesia, part V, pp. 1-88. London: London School of Hygiene and Tropical Medicine, 1928.

genital region are benign, their repetition is troublesome and the recovery may not be complete or may be delayed because of the peculiar anatomy of the lymph spaces in this region.

After leaving the endemic area, it seems that more often no further attack will follow; occasionally one severe attack occurs within the first five months, or several mild attacks may appear during the first year in a nonendemic area.

To summarize the *treatment,* the first type of early filariasis does not require any treatment, the second type responds to sulphonamide, and the third type, if not resolving spontaneously, responds quickly to surgical treatment; that is, to a simple incision and insertion of a wick. For late filariasis, surgical treatment is indicated for hydrocele and more localized elephantiasis, mainly of scrotum and penis, but is hardly ever required after a residence of several years or a shorter term in an endemic area.

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# Sudden Death in Patient Supposed to Have Myocarditis Following Scrub Typhus

COLONEL JULIEN E. BENJAMIN
Medical Corps, Army of the United States
LIEUT. COLONEL RENO R. PORTER
Medical Corps, Army of the United States
and
FIRST LIEUT. ROBERT H. DREISBACH
Medical Corps, Army of the United States

Several papers have appeared in the literature concerning the clinical features and the pathologic picture of the acute stage of scrub typhus fever but none have stated whether or not the pathologic changes described in the heart were permanent.[1 2] The case described here offered an opportunity to study the tissues of a patient who died suddenly five months following the acute stage of the disease.

Scrub typhus fever is a rickettsial disease widely distributed in the Asiatic-Pacific area. It is transmitted to man by the larva of a mite of the genus *Trombicula.* These larvae seem to thrive in areas of dense scrub or grass along river bottoms. The disease is characterized by sudden onset of headache, malaise, and fever which rises slowly to 104° or 105°, and a macular erythematous rash over face, trunk, and abdomen. An ulcerated necrotic lesion, the eschar, is usually found

Major Marino F. Vidoli, Laboratory Section, Lovell General Hospital, and Dr. Benjamin Castleman, Mason General Hospital, studied and reported on the tissue section concerned in the present report.

1. Ahlm, C. E., and Lipshutz, J.: Tsutsugamushi Fever in the Southwest Pacific Theater, J.A.M.A., 124:1095-1100, 15 Apr. 1944.

2. Corbett, Austin J.: Scrub Typhus, Bull. U. S. Army M. Dept., 70:34-54, Nov. 1943.

on the lower extremities, in the inguinal region, or in the axilla, and represents the site of attachment of the vector. Signs of pneumonia may be present. A large number of patients show evidence of circulatory involvement, with tachycardia, hypotension, and pulmonary congestion. Many investigators feel that these changes are due to myocardial involvement,[2 3] and capillary failure. Death may be due to circulatory failure or pneumonia. Diagnosis can be made by finding a rising titer in the patient's blood, usually to 1:160 or more, of agglutinins for *Proteus* OXK bacillus. Mouse inoculation of the patient's blood, and, later, the finding of rickettsial bodies in a smear made from scrapings from the serous membranes, are confirmatory.

Recovery is usually assured after the twentieth day of the illness, but a prolonged period of bed rest and convalescent care is necessary. Some authors believe there is a possibility of permanent myocardial damage, since extreme fatigue and rapid pulse are noted on exertion even after several months.[4]

The general pathologic picture is a vasculitis and perivasculitis of the smaller blood vessels, principally of the skin, lungs, heart, and brain. Surrounding the vessels are accumulations of plasma cells, monocytes, and lymphocytes, with damage to surrounding cells in severe lesions. There may be focal edema and interstitial infiltration of round cells. In some cases, the lungs may show swelling of the alveolar walls and an exudate of mononuclear cells, red cells, and plasma. The case fatality rate varies from 2 to 10 percent, although in certain areas a 50 percent death rate has been reported.[5]

## CASE REPORT

A 33-year-old soldier was well until 23 May 1944, when he had chills and fever while in combat in North Burma. These symptoms increased in severity and four days later he was hospitalized. At that time he was acutely ill, had a temperature of 102°, and showed a generalized maculopapular rash. No ulcer was seen. General lymphadenopathy was present. The patient's subsequent course in the hospital was stormy; the febrile period lasted twenty-seven days, with temperature to 104° and 105° twice daily for the first two weeks. During this period he developed evidences of extensive pulmonary involvement as manifested by rales in the lung bases, dullness to percussion, and x-ray evidence of consolidation in the right lower lobe. There was also evidence suggestive of myocardial damage manifested by the presence of tachycardia, gallop rhythm, and x-ray evidence of slight cardiac dilatation. A progressive anemia developed to 10 gm. The urine contained red blood cells, casts, and albumin. The Weil-Felix became positive, and the titer rose to 1/100 at the end of four weeks with OXK organism. It was negative for OX 2 and OX 19. Following the acute febrile period, patient had a prolonged convalescence. He had no fever after 18 June 1944, but by August was still quite weak and had many "effort symptoms." It was felt that he was disqualified for further overseas service, and he was evacuated to the zone of the interior, arriving

3. Lipman, B. L., Byron, R. A., and Casey, A. V.: Clinical Survey of Scrub Typhus Fever, Bull. U. S. Army M. Dept., 72:63-70, Jan. 1944.
4. Logue, J. B.: Scrub Typhus, Nav. Med. Bull., 43:645-649, Oct. 1944.
5. Farner, D. S., and Katsampes, C. P.: Tsutsugamushi Disease, Nav. Med. Bull., 43:800-836, Oct. 1944.

at Lovell General Hospital on 7 October 1944. At that time he stated that he felt weak, especially in his legs, and noted easy fatigue and shortness of breath on mild exertion. His appetite was poor, but he had regained the 38 pounds he had lost during his illness. Physical examination was essentially negative. Blood pressure was 115/70. Routine laboratory studies were normal. Chest x-ray was negative. Electrocardiogram was within normal limits.

After observation in this hospital for about two weeks, the patient was granted a convalescent furlough. While at home he felt well, usually going for a short walk every day. About 6 November, he began to have occasional discomfort over the heart, which continued for the next two days. On 8 November he arose late, had a light meal, and spoke again of the discomfort over his heart. While sitting at table, he complained of nausea, and promptly vomited. He slumped in his chair and expired shortly afterward.

At autopsy, the essential findings were in the heart. Section of the myocardium revealed a brownish-red color, normal consistency, and appearance. Columnae carneae, chordae tendineae, and valves were normal. The orifice of the left coronary artery appeared constricted and was completely blocked by a small, soft, granular, gray-red mass 2 to 3 mm. in diameter. On cross section of the coronary artery, distal to the orifice, this mass continued to be present for a distance of about 1.5 cm. and completely filled the lumen. The greatest diameter of the coronary vessel in the region of the thrombus was about 4 mm. and its wall was eccentrically thickened by a firm, yellowish-white process. Distal to the thrombus, the lumen was much smaller, but the yellowish-white process continued to be present in about one-half the circumference of the mass for another 1.5 cm. Several other minute areas of atheromatous change were noted on further sectioning. The right coronary was normal. Microscopic examination of sections of the heart revealed a *perfectly normal myocardium.* Changes in the myocardium ordinarily associated with coronary occlusion were absent, since the patient expired immediately after the closure of the vessel. There were no changes in the myocardium which could have been the result of myocardial injuries during scrub typhus fever. However, there was widespread sclerosis of the coronary arteries. The microscopic appearance of the vessels was the same as is ordinarily found in coronary arteriosclerosis, and not a result of changes produced by scrub typhus fever.

## DISCUSSION

Confusion is current regarding the sequelae of scrub typhus. While it is true that the disease, during its acute and unpredictable course, attacks the cardiovascular system with considerable force (true in this case), no reliable evidence has been reported of permanent damage to the heart or, for that matter, to any other important organ. Still, many patients have been returned from overseas supposedly suffering from "myocarditis following scrub typhus fever." Examination of a large number of such patients and of their complaints definitely indicates their disability to be similar to that of another large group—namely, neurocirculatory asthenics.

The complaints were dyspnea, effort trouble, palpitation, fatigability, nervousness, weakness, excessive perspiration, tremulousness, faintness, and indigestion. The symptoms were

not simply the result of effort. Examination revealed rather anxious, pale young men, with no evidence of having organic heart disease. Serial electrocardiograms in every instance were within normal limits and x-rays of the heart failed to show any enlargement. In other words, the picture was that of neurocirculatory asthenia frequently noted following infectious diseases. Experience in evaluating possible aftereffects of this infection was meager, if not wholly lacking, and, because it was impracticable to retain patients for protracted periods when return to duty in a reasonable time was doubtful, a considerable number of soldiers were returned to the zone of the interior with the diagnosis of residual myocarditis caused by scrub typhus. This was especially true following the early outbreaks. Doubtless, residual myocarditis was suspected because of the disabling symptoms, although, except in rheumatic fever, it is rarely seen after infections.

The patient was returned from overseas because of weakness, dyspnea on moderate exertion, fatigability, and anorexia. Physical examination was entirely unrevealing. The cardiovascular system was beyond suspicion. The soldier died with dramatic suddenness while on furlough and not during exertion. The necropsy findings were especially significant in that *absolutely no evidence of any type of myocarditis* was noted. The sudden death resulted from an acute, occlusive, coronary thrombosis on the basis of intimal sclerosis of the coronary artery.

It will require a span of years to accumulate sufficient information to prove whether any permanent heart damage is sustained as a result of this infectious disease. It is conceivable that myocardial scars might occur. This patient died of an acute heart attack which, on careful scrutiny, cannot even remotely be related to any residuals of acute myocarditis.

## SUMMARY

A patient alleged to have scrub typhus myocarditis died suddenly of acute coronary thrombosis. Postmortem findings and microscopic examination of sections of the myocardium disclosed a perfectly normal heart muscle. Evidence of coronary thrombosis and intimal sclerosis was apparent in the pathologic specimens. The disabling symptoms of which many scrub typhus patients complain are probably due to neurocirculatory asthenia.

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**Dental Operating Lamp.**—A new dental field operating light, 110 volt, a.c.-d.c., has been approved as a standard article to be distributed, one per M.D. Chest No. 60. The lamp is a light, adjustable, field type, mounted on an extension rod with an anchor base which can be secured to a table top by means of a clamp, to a wall by screws or bolts, or to the top of the M.D. Chest No. 60 by placing the lamp base on the cross rod.

Vol. IV
No. 2

# Apparatus and Clinical Notes

## HERXHEIMER SYNDROME FOLLOWING PENICILLIN IN UNSUSPECTED SYPHILIS

CAPTAIN FRANZ K. BAUER
Medical Corps, Army of the United States
and
MAJOR CHARLES F. EGOLF
Medical Corps, Army of the United States

A report[1] to the Penicillin Panel of the Subcommittee on Venereal Diseases, National Research Council, on the treatment of early syphilis with penicillin, states that, of 1,418 patients treated, 846, or 59 percent, had Herxheimer reactions within the first twenty-four hours. In no case had the reaction been alarming, nor had it interfered with subsequent treatment. A report[2] on the action of penicillin in late syphilis states that, of 182 cases treated, 43, or 24 percent, had Herxheimer reactions. All these reactions were observed in the treatment of known cases of syphilis. For months, an increasing number of reports have warned of the possible masking effect penicillin can have on unsuspected syphilis when given for associated conditions, such as gonorrhea.

This communication is based on observations on two patients treated with penicillin for gonorrhea and chancroid complicated by persistent gram-positive cocci, respectively, in whom symptoms of syphilis were brought forth in a dramatic way. In neither case was syphilis apparent at the time penicillin was given.

CASE 1. A Negro male, aged 25, noticed, about 15 October 1944, a "pimple" on the shaft of his penis, which was not painful. At sick call on 16 October this "pimple" was found to be small and hard, about 2 mm. in diameter, indolent, of pinkish appearance, and clean. Three darkfield examinations and two Kahn tests between 16 and 18 October were all negative. The patient returned twice weekly for repeat darkfield examinations and weekly serologic tests for syphilis, all of which were negative. There was a history of repeated, unprotected sexual exposures throughout August, September, and October.

The patient had gonorrhea in civil life in 1939, which was treated with "sulfa" tablets with good results. He had gonorrhea twice since entering the Army in 1943. On both occasions he responded to sulfonamide therapy. In February 1944 he had a lesion in the sulcus which was darkfield positive, and a diagnosis of primary syphilis was made. He was given the twenty-six-week course of mapharsen and bismuth, as employed by the Army,[3] and his treatment was completed in August 1944. At no time had his serologic test for syphilis become positive. He was put on observation in August 1944.

The patient presented himself again on 15 November 1944, when he had a purulent urethral discharge. He gave a history of an unprotected exposure about ten days before. The penile lesion on the shaft had not changed in appearance since it was first seen by the medical officers on 16 October 1944. Smear of the discharge was positive for gonococci and the patient was started on penicillin. He was given a total of 100,000 Oxford units of penicillin, five injections, three hours apart, of 20,000

1. Moore, J. E., Mahoney, J. F., Schwartz, W., Sternberg, T., and Wood, W. B.: Treatment of Early Syphilis with Penicillin; Preliminary Report of 1,418 Cases, J. A. M. A., 126:67-73, 9 Sept. 1944.
2. Stokes, J. H., Sternberg, T. H., Schwartz, W. H., Moore, J. E., and Wood, W. B., Jr.: Action of Penicillin in Late Syphilis, J. A. M. A., 126:73-79, 9 Sept. 1944.
3. Diagnosis and Treatment of the Venereal Diseases, Circular Letter No. 74, 25 July 1942, Office of The Surgeon General.

units each, without untoward effect. Following this series of injections, there was only a slight watery discharge so frequently seen after penicillin therapy, and the smears were negative. Patient felt perfectly well and was told to return the next morning.

Eighteen hours following the last injection of penicillin, the penile lesion was edematous, slightly painful, and indurated. The inguinal lymph nodes were enlarged, but not tender. A darkfield examination showed typical *Treponema pallidum*, 2 to 3 per field, and Kahn and Wassermann tests taken at the same time were reported doubtful. The patient was then started on penicillin therapy for syphilis as outlined in TB MED 106,[4] and his chancre dried up completely after fifteen injections of 40,000 units of penicillin.

CASE 2. A white male, 19 years of age, was admitted on 14 October 1944 with ulcers under the prepuce and on the prepuce of one day's duration. He gave history of unprotected intercourse three weeks before admission and noticed five painful, small, irregular, soft, shallow ulcers covered with grayish exudate one day before admission. His prepuce was swollen and edematous, and the inguinal nodes were enlarged and slightly tender. There was no urethral discharge. Darkfield examinations and Kahn tests were negative. A smear from the lesions was positive for *Hemophilus ducreyi*. The patient was started on sulfadiazine, 1 gm. every four hours by mouth, and sulfanilamide powder locally to the lesions. Darkfield examinations were done daily for the next four days. Another Kahn test on 18 October was negative. The lesions did not seem to respond and another smear on 17 October was positive for *H. ducreyi*. A darkfield on that date was negative. On 18 October the lesion looked worse. There was a considerable degree of phimosis, and the penis was swollen and very painful. The ulcers had not changed in appearance and many gram-positive cocci were seen on the smears. Ultraviolet light was started to the penis and sulfadiazine continued without any effect. Darkfield examinations were done every other day and were always negative. Although a sulfa level of 12 mg. percent was reached on 27 October, it was decided to discontinue sulfa therapy and to start the patient on penicillin. He was given 20,000 units of penicillin intramuscularly into the buttock, after which he noted a queer sensation in his legs (as if he were moving them with difficulty) and a dull headache over the entire head. After the second injection of 20,000 units three hours later, the headache became much worse and he began to feel sore all over the body. He was given a third injection three hours later and this was followed by a sudden rise in temperature to 103° F. At this time the patient felt very hot, soon followed by chilliness necessitating the use of blankets. He perspired profusely. His skin was cold and clammy. The pulse was rapid and weak. The headache by this time was very intense, and he presented signs and symptoms of shock. Lungs and heart were negative. The abdomen was soft and not tender. One hour later he was still complaining of headaches, but he was perspiring profusely and complaining of sharp and sticky pain in the mid-epigastrium. He had vomited one-half hour after the third injection of penicillin, which was then discontinued. On 31 October 1944 a dorsal slit was done, and darkfield and serologic examinations were repeated. The darkfield was negative, but the Kahn test, as well as the Wassermann reaction, was reported doubtful. The next day the Kahn test was positive (40 units) and the Wassermann positive. On 3 November 1944, he again had a positive Kahn (40 units) and a positive Wassermann. It was then apparent that this was a Herxheimer reaction, and the patient was started

4. Penicillin Treatment of Syphilis, War Department Technical Bulletin TB MED 106, 11 October 1944.

on mapharsen and bismuth, after which his lesions cleared up within ten days. At no time was a positive darkfield obtained. The penicillin was checked and a skin test on the patient was negative. The same lot had been used on several other patients without any untoward effects.

The first case illustrates two points: (1) The twenty-six-week mapharsen-bismuth course of treatment employed by the Army, which this man received for his primary, darkfield positive, seronegative syphilis in February 1944, had apparently effected a complete cure. The different site of the present lesion and the rise in reagin following the administration of penicillin are considered points in favor of a reinfection. (2) A hitherto darkfield negative penile lesion became edematous, indurated, and darkfield positive eighteen hours following the fifth and last injection of 20,000 Oxford units of penicillin for gonorrhea. The Kahn and Wassermann reactions which had been negative only two days before were both doubtful.

The second case showed a dramatic reaction to the third dose of 20,000 Oxford units of penicillin, characterized by fever of 103° F., a shocklike state, agonizing headaches, and nausea with vomiting. This man's Kahn and Wassermann reactions became strongly positive in a rising titer up to 40 Kahn units, at which time mapharsen and bismuth therapy was instituted. Penicillin was discontinued because this episode was thought to be a reaction to the drug. On mapharsen and bismuth, the lesion cleared up almost completely within ten days.

"Reactions" to penicillin consisting of headaches, malaise, vomiting, fever, and shocklike state should suggest the possibility of a systemic Herxheimer reaction in unsuspected syphilis.

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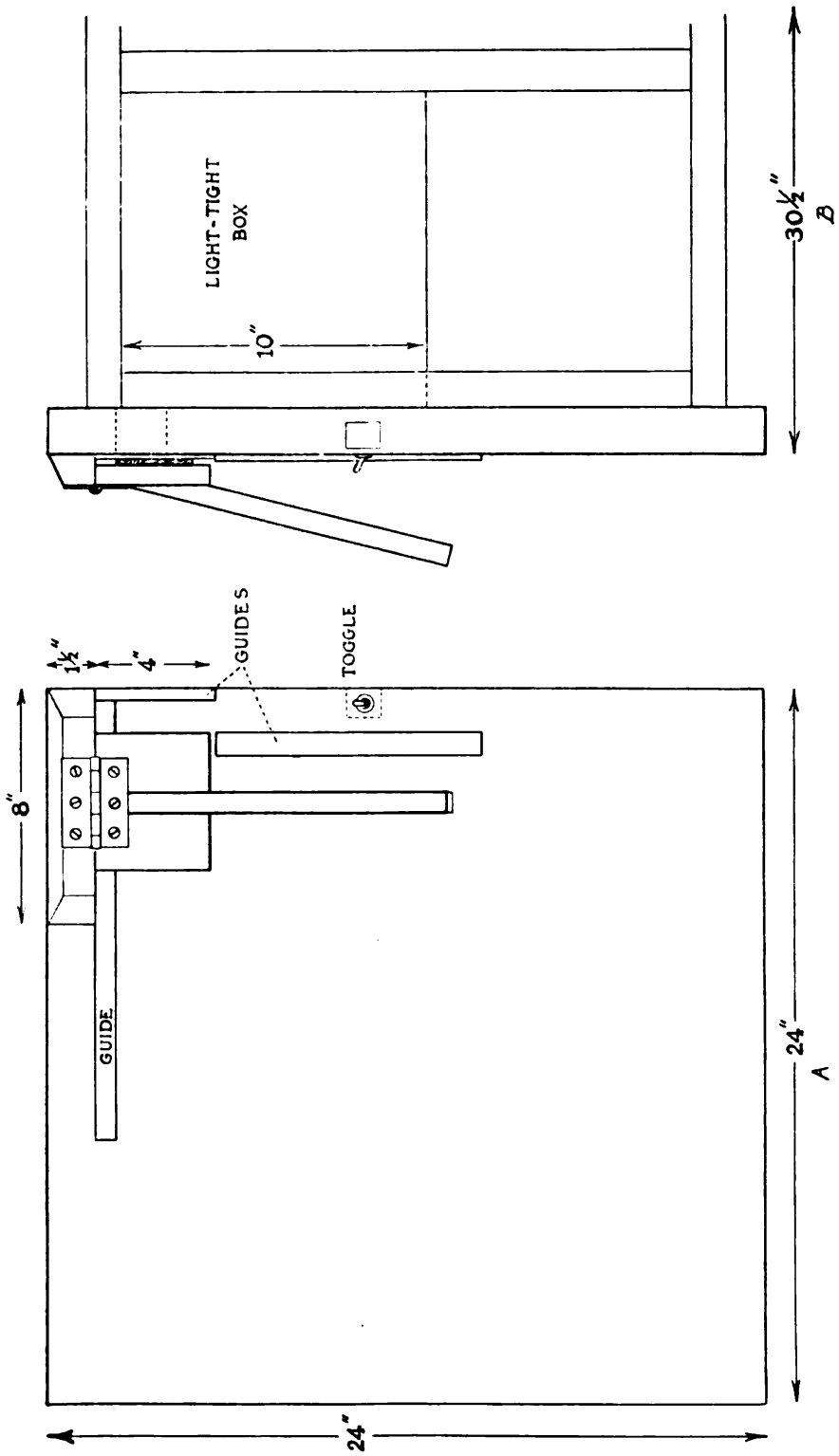
## CONTACT PRINTER FOR FILM IDENTIFICATION

LIEUT. COLONEL PHILIP J. HODES
Medical Corps, Army of the United States

The present communication calls attention to a simple and effective photographic method for marking films. The procedure is not new. The apparatus we are using, however, is "home made" and can easily be constructed in any military installation.

When the patient is first seen in the radiological department, his name, serial number, hospital register number, and departmental film file number are typewritten on an ordinary 3- by 5-inch filing card. The last name is entered on the card first, to facilitate filing, as these cards become a part of our permanent departmental filing system. The filing card is then passed into the film processing room where it is photographed on the patient's exposed roentgenogram.

To photograph these data, one portion of the exposed film must be protected from the roentgen rays. This is accomplished by fixing on the surface of all film holders a rectangular piece of lead sheeting equal in size to that area which is to be photographed. Experience led us to decide on ⅛-inch lead sheeting cut into sections 1¼ by 3 inches. The identifying remarks are then printed on this portion of the film by direct contact. Our printing device is built into an ordinary ward bedside table. A slot, 1¼ by 3 inches, cut into the table top, transmits the artificial light from a light-tight compartment below the table top through the filing card, to the film. The data on the typewritten filing card are thus photographed on the roentgenogram. It is essential that the filing card and the lead protected portion of the film fit exactly over the hole in the table top. This




THE CONTACT PRINTER

Figure A shows the characteristics and measurements of the top of the table, as seen from above.

may be facilitated by nailing two pieces of wood to the table top at right angles to each other in such fashion as to assure proper centering of the filing card and the film in the dark. The transmitted light can be prevented from striking the remaining portions of the exposed radiograph by constructing a lid which covers the lighted portion of the field. A piece of sponge rubber, glued to the lid, assures a snug light-tight fit which will not scratch the film. (See drawing.) This also serves to press the film against the card and the glass-covered aperture, an essential in contact printing. The light source may vary. A fifteen-watt bulb is adequate. Indeed an ordinary flashlight bulb and batteries will suffice. (We are using the latter at the present time.)

It is essential that the letters typewritten on the filing card stand out clearly, or the results will not be satisfactory. We have found it advisable to reverse a sheet of carbon paper so that it prints the letters on the back of the card at the same time that the data are being entered on the face of the card.

The date of the examination is not included on the card. This allows one to use the same card on different days. The date is marked on the film in the conventional manner with lead numerals.

If necessary the name of the medical unit examining the patient may be entered on the card. It is more convenient to use specially prepared lead markers for this; other identifying marks such as "R," "L," "AP," etc., are used in the conventional manner.

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## IMPROVISED HYDROTHERAPY UNIT

CAPTAIN DONALD HAYES RUSSELL
Medical Corps, Army of the United States

In handling early acute psychotics at a station hospital at an advanced Southwest Pacific base, some type of sedative hydrotherapy was necessary, and a simple unit for administering the continuous, tepid tub bath was constructed. This unit has proved most satisfactory, although lacking many refinements of the manufactured article. Details of construction (figures 1, 2, 3, and 4) are presented. The canvas tub and hammock could be made items of issue to field medical installations handling psychotics, as the tub and frame and heating unit are more readily improvised.

The canvas parts were made from model patterns by a quartermaster tent repair unit. The tub, roughly 7 by 3 by 3 feet, was made of extra heavy waterproofed canvas, double-stitched at the seams. The upper edges of all four sides were extended about 8 inches to form flaps containing a row of eyelets which, laced through with ropes, support the tub on the frame. The tub when filled should not touch the floor, but must be completely supported on the frame. The oblong hammock, 2 feet 4 inches by 6 feet, was made of two layers of duck canvas. For reinforcement, a length of rope

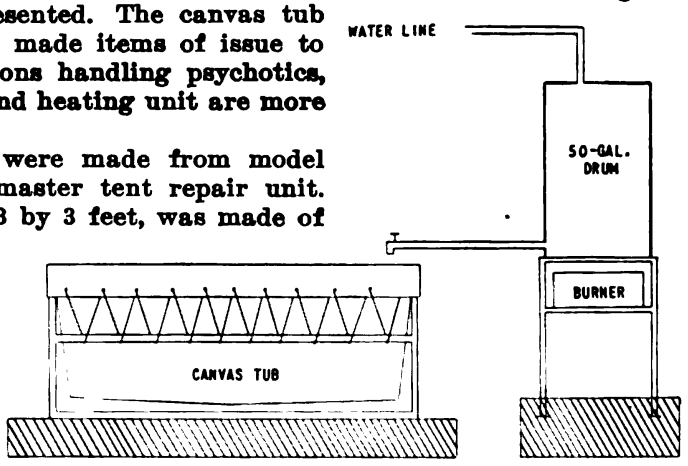


FIGURE 1. Cross-sectional diagram of the hydrotherapy unit.

was sewed into the outer edge. Ten common 1-inch webbing straps were stitched along the edge of the hammock. These straps, about 6 feet long, are equipped with standard buckles and serve to tie the hammock to the frame. Thus, both the tub and hammock are adjustable. A cover, made of a single layer of duck, serves to partially conceal the patient's body from view and to protect the tub when not in use.

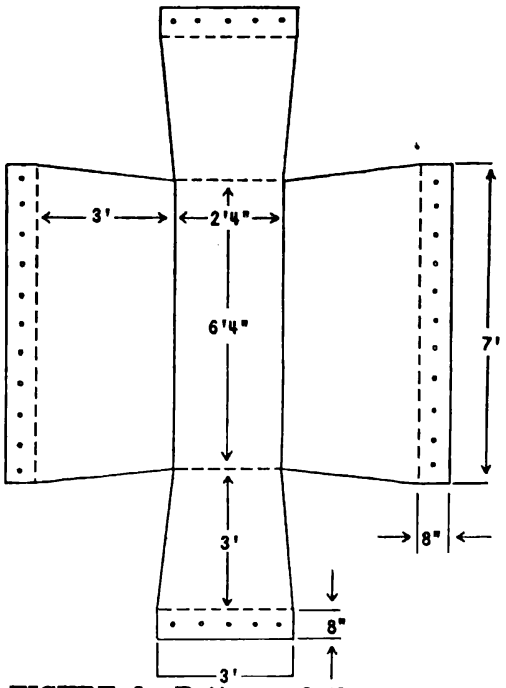


FIGURE 2. Pattern of the canvas for the tub.

The frame was constructed of standard ¾-inch pipe, mitered and welded at the corners. The middle bar serves to fasten the supporting ropes and straps of the tub and hammock. A sturdy framework made of lumber would serve equally well. The tub with the water is quite heavy, and this must be considered when building a frame.

The heating unit consists of a stand made of welded pipe which supports a 50-gallon drum. The stand has a shelf which holds a standard field burner. A pipe from the bottom of the drum carries the water by gravity flow to the tub. Running water is connected directly to the top of the closed drum so that it is kept automatically filled at all times. In this tropical climate, the desired temperature for the water is only a few degrees above the existing tap-water temperature. In a temperate climate, probably, a better heating system would have to be devised.

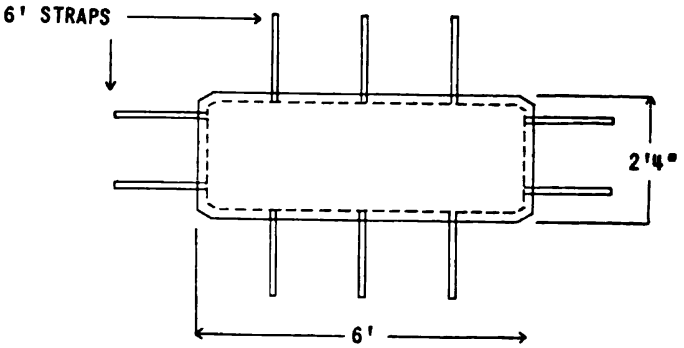


FIGURE 3. Pattern for the canvas hammock.

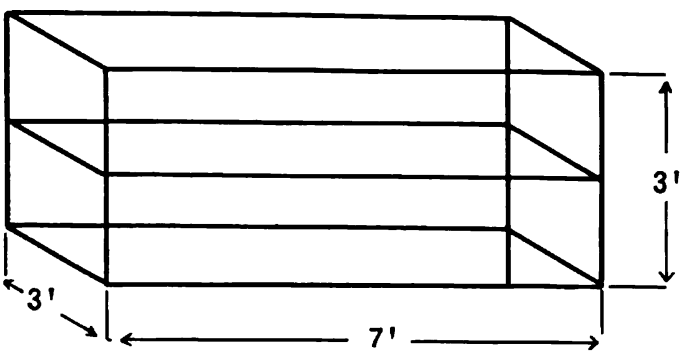


FIGURE 4. Dimensional drawing of the tub frame.

The usual rules for tepid tub therapy are followed in using this setup. Excellent results were obtained by treating psychotic and agitated psychoneurotic patients with this simple method of applying hydrotherapy.

# Index



*(Over)*

X-ray

Carlisle Barracks, Pa., 7-5-45—75,500